COUNTY BOROUGH OF ROCHDALE.

REPORT

ON THE

Health of Rochdale

AND

The Medical Inspection of School Children,

FOR THE

YEAR ENDING, 31st DECEMBER, 1909.

A. G. ANDERSON, M.D., D.Sc., M.A., D.P.H.,
Medical Officer of Health.

ROCHDALE:
E. WRIGLEY AND SONS LIMITED., ACKER STREET.

1910.

Digitized by the Internet Archive
in 2018 with funding from
Wellcome Library

https://archive.org/details/b30038157

Preface.

To the Chairman and Members of the Health Committee of the County Borough of Rochdale.

GENTLEMEN,

I have the honour to submit to you my First Annual Report on the Health Conditions of this Borough ; and the Report on the Medical Inspection of School Children.

But before proceeding with the Report proper, there are two circumstances which warrant a brief digression and call for special reference.

FIRST.—In the beginning of the present year we had to record the loss sustained by the death of Alderman W. Hardman, J.P., and Ex-Mayor, who for many years was a prominent Member of the Council, and for nearly twenty years acted as Chairman of the Health Committee with dignity and precision.

SECONDLY.—The protracted depression and unsatisfactory condition of the great cotton spinning industry, which not only affects Lancashire directly, but indirectly a much wider area, we all regret ; and hope from the so far favourable reports of this year's crop, that the continued shortage of raw material may be early replaced by a plentiful supply. In this respect the too long delayed encouragement now given to the cultivation of the cotton plant in every British Colony, where the climate and conditions are suitable, should ultimately have a steadying and controlling effect on our supplies ; and further do much to relieve this great industry with its great army of workers from the interminable sudden fluctuations of the American Cotton Markets, in so far as these are due to exchange manipulations.

Of the underlying economics of this industry I claim no special knowledge ; and with all due respect will only venture to suggest another aspect of this question.

Do we in this Country, as fully as our foreign competitors, realise the advantages that often follow from the application of Science to our Arts and Industries ? and further, do we so profit by the repeated advice given by our Consular Agents, as to lay aside the conservatism of the past ; and, while we offer a better article, do we trim our business tactics with the same pushful up-to-dateness and linguistic setting as our competitors in the more distant and newer markets of the world.

Turning then to the report proper, which as will be seen, is presented in four Sections with an opening Statistical Summary and one Appendix.

Section I. is chiefly statistical, dealing with the Marriage, Birth, and Death-rates ; and Infantile mortality, the most prominent features of which are the comparative low Marriage and Birth-rates, which are considerably counterbalanced by the slowly declining Death-rate ; and during the year under review, the very marked and gratifying fall in the Infantile Mortality rate. This fall marks a great record which may be difficult to maintain ; although, even as yet, we are a long way from what might be considered a normal infantile death-rate.

Section II. is divided into two parts. The first and minor deals with the zymotic conditions and zymotic death-rates ; while the subject of Small-pox and vaccination, and some of the significant and probable results of the personal and public attitude towards vaccination are considered as their importance demands ; and the utility of Isolation and Fever Hospitals is also passed under review. The incidence of zymotic disease was very low, and the zymotic death-rate the lowest on record ; but it has to be kept in view that a continuous declining birth-rate by tending to alter the age-constitution, also tends to diminish the numbers living at the earlier and most susceptible age periods.

In the second part of this section an attempt is made to review briefly the problem of Tuberculosis from the public health administrative point of view. This work suggested itself ; as the whole question is presently under the consideration of this Health Authority.

Section III. is a résumé of the Departmental Work under its various divisions with some comments on the more important features ; and the excellent work done by the Joint Committee on the conversion of present systems of sewage disposal to the fresh-water carriage system is duly referred to in its place.

Section IV. represents the Report on the Medical Inspection of School Children, with its own preface and table of contents.

The Appendix to this Report is a copy of the original Milk-Report, with a specimen page of what formed Appendix A. of this Report. These appended copies have not been reprinted for this purpose, but were kindly supplied by the printers of the Milk Report when they printed the abridged copies, which were supplied to the dairy farmers,

The special Report on an investigation of the Housing Conditions in this Borough, the preparation of which has entailed considerable time and labour, is now ready ; and will be issued separately at a later date.

In conclusion, it is my pleasant duty to acknowledge the unfailing encouragement and support which I have received, since entering on office here in January, 1909, from both the late and present Chairman, and Members of the Health Committee.

Further I wish to acknowledge the loyalty and devotion to duty of all the members of the Health Staff ; and in the preparation of this and other special Reports the work done by Mr. Schofield, (Chief Clerk), and Mr. Duncan (Assistant Sanitary Inspector), deserves special commendation.

I have the honour to be,
Gentlemen,
Your obedient Servant,

A. G. Anderson

Medical Officer of Health.

TOWN HALL,
July, 1910.

Contents.

SECTION I.—Vital Statistics.

PAGE
Population ... 2
Marriages ... 3
Births ... 3—6
Deaths ... 6—13
Chief Meteorological Features ... 13
Infantile Mortality ... 13—17

Tables.

Table I.—Birth-rates of surrounding Towns, 1909.
,, II.—Chief Vital Statistics of the Wards of the Borough.
,, III.—Summary of Causes of Death, 1909 (L.G.B. Return).
,, IV.—Mortality from principal groups of diseases.
,, V.—Abstract of Meteorology and Mortality, 1904-1909.
,, VI.—Mortality from All Causes according to age, 1904-1909.
,, VII.—Vital Statistics of Registration Districts (L.G.B. Return).
,, VIII.—Vital Statistics of the whole Borough for 10 years (L.G.B. Return).
,, IX.—Detailed and extended classification of Causes of Death, 1909.
,, X.—Infantile Mortality, 1909 ; Deaths classified according to age and feeding (L.G.B. Return).
,, XI.—Mortality per 1,000 births according to age and feeding.
,, XII.—Infantile Mortality according to the number of persons per Room, &c.

Charts.

Chart A.—Comparative View of Chief Causes of Death, 1909.
,, B.—Meteorology and Weekly Deaths, 1909.
,, C.—Infantile Mortality and Birth and Death-rates during the past 35 years.

SECTION II.—Infectious Disease.

PAGES
Small-pox and Vaccination ... 18, 21—24
Scarlet Fever ... 18, 27
Diphtheria ... 20, 28—30
Typhoid Fever ... 20, 30—33
Typhus Fever ... 20
Erysipelas ... 20
Puerperal Fever ... 21
Case Mortality ... 21
Hospital Return Cases ... 36--39
Measles ... 39—40
Whooping Cough ... 40, 41
Chicken-pox ... 41
Cerebro-spinal Meningitis ... 41, 42
Zymotic Enteritis or Epidemic Diarrhœa ... 42, 43
Tuberculosis—
    Phthisis Notifications ... 45, 46
    Chief Sources of Infection—The Bacillus Tuberculosis the causal Micro-organism 46, 47
    Pathways of Infection ... 46
    Some considerations regarding expectoration from the public health point of view—
        Wet Sputa—Dried Sputa ... 47, 48
    The Infectivity and tenacity of dried dust in houses ... 48, 49
    Relative importance of some sources of infection ... 49—51
    Investigation of cases notified ... 51
    Occupational-influences ... 54, 55
    Domestic Infection ... 55—57
    Latent Tuberculosis ... 57, 58
    Tuberculosis as affected by Housing and Overcrowding ... 58
    Heredity in its relation to Tuberculosis ... 58—60
    Some further Environmental considerations—chiefly as regards Housing Conditions 60, 61
    Effects of Urbanisation of the people to Phthisis ... 61, 62
    Dampness in Houses ... 62, 63
    Intemperance and Destitution ... 63, 64
    Administrative measures for the control of and prevention of Tuberculosis ... 64—66
    Administrative procedure in this Borough ... 66, 67
    Attitude of English and Scottish Local Government Boards ... 67, 68
    Compulsory notification of Phthisis ... 68

PAGES
Tuberculosis Dispensaries and their field of work 69
The Magnitude of the work and need of organization 69
State interference and Charities 70
The rôle of Sanatoria and sanatorial Treatment 71
Some economic considerations 71, 72
Tuberculosis Colonies 72
Hospitals for advanced and dying cases 72
Some considerations on the Compulsory Notification of Phthisis ; and Administrative measures—Educative measures ... ...73—75
Comparative Phthisis mortality of Rochdale with other manufacturing towns ... 76

Tables.

Table I.—Morbidity and mortality of Infectious Disease during each year, 1892-1909 incl.
,, II.—Return of Vaccination during 9 years, 1900-8.
,, III.—Cases of Infectious Disease notified or discovered during 1909 ; and distributed into Wards.
,, IV.—Progress of Infectious Disease during 1909, being cases notified in each month.
,, V.—Diphtheria, 1909—Sanitary condition of the houses where the disease occurred.
,, VI.—Scarlet Fever, Enteric Fever, Diphtheria—Percentage of deaths to sicknesses at each age period.
,, VII.—Scarlet Fever, Enteric Fever, and Diphtheria—Attacks and attack-rates for each Ward.
,, VIII.—Seven Principal Zymotic diseases—death-rates for 10 years.
,, IX.—Scarlet Fever, Enteric Fever, Diphtheria—Attack-rates and Zymotic death-rate for Rochdale and other Towns.
,, X.—Return of cases treated in Marland Hospital, 1909.
,, XI.—Deaths at various age periods from Tubercular diseases ; compared with zymotic diseases and All Causes.
,, XII.—Phthisis—Particulars of cases notified, 1909.
,, XIII.—Supposed Cause of Phthisis (according to patients and relatives).
,, XIV.—Distribution of Phthisis deaths, 1909.
,, XV.—Phthisis—Occupation of cases notified ; and death cases.
,, XVI.—Summary of Analysis of likely or possible sources of infection.
,, XVII.—Respiratory and Tubercular diseases—comparative death-rates of Rochdale and other towns.

Charts.

Chart D.—Death-rate from Phthisis for Rochdale, and England and Wales during the past 35 years.

SECTION III.—Departmental Work.

Health Visitors' Work 77
Notification of Births Act, 1907 ... ... 77, 78
Midwives' Act, 1902 ... ... 78, 79
Water Supply 80
Bacteriological Laboratory 81
Disposal of Sewage 81
Work of the Joint Committee on the scheme of closet conversion ... ...82—84
Black Smoke abatement ... ...84—86
Sale of Food and Drugs Acts 86, 87
Cowsheds, Dairies and Milk Supplies 87
Meat and Food Inspection 88
Slaughter-houses ... ...89—91
Offensive Trades 91, 92
Factory and Workshops Act ... ...92—94
Rochdale Improvement Act 94
Housing and Town Planning Act ; and Housing of Working Classes Acts... 94
Improvement to Insanitary Properties 95
Nuisances under the Public Health Act 96, 97
Infectious Disease (cases isolated and removed to Hospital) 98
Disinfection 98
Canal Boats Acts 99

County Borough of Rochdale.

Summary of Statistics,

Year 1909.

Area of Borough			acres 6,446
Population (Est. 1909)	Males	41,725	89,654
	Females	47,929	
Density			persons per acre 13·9
Total Number of Tenements at 1901 Census			20,233
Number of Inhabitants per House at 1901 Census			4·1
No. of Marriages Recorded in the Registration District of Rochdale			987
Marriage-Rate per 1,000 of Estimated Population of Rochdale Registration District			7·7
Births Registered	Males	1,030	2,063
	Females	1,033	
Birth-Rate per 1,000 of Estimated Population			23·0
Deaths	Males	699	1,442
	Females	743	
Death-Rate (All Causes) per 1,000 of Estimated Population			16·1
Seven Zymotic Diseases—Death-rate per 1,000 of Population			0·64
Respiratory Diseases (excl. Phthisis) ,, ,,			3·05
Pulmonary Phthisis— ,, ,, ,,			1·08
Number of Deaths of Children under 1 year of age to every 1,000 Births Registered			102

SECTION I.

Vital Statistics.

Population.

The population estimated to the middle of the year 1909 was 89,654, or an increase of 834 on the estimated figure of 1908.

This is the Registrar General's estimate, and is calculated by a method consisting of a combination of both arithmetical and geometrical progression, and which may be explained as follows. The population of the Borough is first estimated by arithmetical progression, assuming that the same rate of increase which occurred from 1891 Census to the 1901 Census has been maintained from the last Census to the present date; it is then multiplied by a factor obtained by dividing the population of England and Wales estimated by geometrical progression by the same population estimated by arithmetical progression.

In order to avoid any discrepancy with the rates as published by the Registrar General the various birth, death, and sickness rates contained in this report are calculated on the population as estimated above.

It may be here mentioned that the population of the various wards of the Borough have been revised owing to an error of the Registrar General in the Census Returns of 1901.

The male population is estimated to be 41,725, and the female 47,929.

The age distribution of the population estimated on the assumption that the age constitution of the population at the census 1901 has remained unchanged—the method adopted by the Registrar General—is as follows :—

AGE PERIOD	Estimated population at middle of 1909
Under 5 years of age	9,073
5 to 15 years	16,487
15 to 25 ,,	17,653
25 to 65 ,,	43,177
Over 65 years	3,264

The natural increase of births over deaths is 621, as compared with the estimated increase of 834.

The Borough Surveyor has kindly furnished this department with a statement of the number of houses erected in the different wards of the Borough during the year ending 31st December, 1909.

WARD	No. of Houses
CASTLETON EAST	98
CASTLETON SOUTH	43
CASTLETON NORTH	9
CASTLETON WEST	60
CASTLETON MOOR	51
SPOTLAND EAST	1
SPOTLAND WEST	36
WARDLEWORTH EAST	8
WARDLEWORTH WEST	33
WARDLEWORTH SOUTH	7
WUERDLE	25
THE BOROUGH	371

Marriages.

The number of marriages recorded in the Registration district of Rochdale during the year was 987, or 66 less than last year. This gives a marriage-rate of 7·7 per 1,000 persons living. This district is made up of Rochdale Borough and five surrounding districts—Norden, Littleborough, Milnrow, Wardle and Whitworth. The same rate for England and Wales was 14·6 per 1,000 persons living.

Births.

The number of births registered during the year numbered 2,063 (males 1,030, females 1,033; legitimate 1,961, illegitimate 102), equal to an annual birth-rate of 23·0 per 1,000 of the estimated population; as compared with 24·8 in the previous year and 23·8 in the year 1907. Comparing the different wards of the Borough in Table II. we find that Wardleworth West had the highest rate, 27·1; Castleton Moor came next with 25·8; and Castleton North the lowest rate, 14·7 per 1,000. The rate of decline in the birth-rate of Rochdale during the past 30 years—(as far back as any reliable records exist)—is as follows:—

Years	Average Rate
1879—1883...	30·1 per 1,000
1884—1888...	26·8 ,,
1889—1893...	24·9 ,,
1894—1898...	24·6 ,,
1899—1903...	24·0 ,,
1904—1908...	23·4 ,,

The following Table I. shows the birth-rate of some of the surrounding towns:—

TABLE I.

Town	Rate per 1,000 of Population
St. Helens	32·1
Liverpool	31·0
Warrington	30·9
Wigan	30·6
Sheffield	28·2
Salford	28·0
Oldham	27·4
Birmingham	26·7
Stockport	26·3
Nottingham	25·6
Preston	25.5
Bolton	25·2
Burnley	24·9
Huddersfield	24·6
Blackburn	23·0
Leeds	22·8
Leicester	22·2
Bury	20·6
Bradford	18·7
Halifax	17·0
Average Rate 20 Towns	25·6
ROCHDALE	23·0
England and Wales...	25·6
76 Great Towns	25·7

From this Table it will be seen that the birth-rate of Rochdale during the past year was below the average of similar towns.

The birth-rate of the whole of England and Wales, which, for the past year was 25·6 per 1,000 of the population, or 0·9 below the rate in 1908, was lower than the rate of any other year on record.

The Declining Birth-rate.

The declining birth-rate is not a question which affects England only, but all the civilized states of Western Europe, as also some of our colonies, and America. It is computed from the returns of the Registrar General that if any country is to maintain its population, about four children must be born to each marriage that produces children at all. Two of these, on the average of large numbers, will either die early or have no children, while the remaining two are left to continue the race in place of their parents. If there were then no counterbalancing factors and our diminishing birth-rate continue unchecked, it would only be a simple question of time when the British race would become extinct.

Indeed we are told that the late great Koch propounded a theory which will be published soon, and in which he states that the birth-rate of all civilised nations first remains stationary, then declines when a certain stage of progress is reached, or rather when they have become really prosperous. This is a sure sign of degeneration. It is the beginning of the end ; and the world's birth-rate may gradually dwindle to nil, so that the human race will die out from sheer repugnance to perpetuating itself.

It may be said the theory is not without some support from the history of nations. But there are other factors to consider to which the birth-rate is relative. Along with the decline in the birth-rate there has been simultaneously a decline in the death-rate.

But as we are well aware that the death-rate cannot go on declining indefinitely, it then becomes a question of time, if the birth-rate declines unchecked, when the curve of decline of the latter will reach and cross the slower declining curve of the former, when we will have a lower birth-rate than death-rate. (Chart C).

On this basis of calculation and by referring to Chart C, it will be seen that the birth-rate of Rochdale declined by 1·7 in each quinquennium during the past 35 years. Then if we are to suppose that this decline is to continue, and with the death-rate probably reduced to say 15 ; it then follows that in a period of about 30 years both curves would meet, when birth and death-rates would be identical.

But there is strong reason to hope that the present condition of things, although not accidental nor brought about by chance, are only temporary. When the nations of the earth, with their diminishing birth-rates begin to realise that a home-policy which has for its aim the establishment of peace on the earth, and which concerns itself with the affairs of the people and with the encouragement of the home and family is no less renowned than that of war and the sterilising waste of armaments, with their accompanying burdens of increasing taxation, which the thrifty artizan and workman weighs against the family, and which secures as far as practicable, that every home, however humble, shall be a sanitary one, and made as artistic and inviting as possible, and such as to re-establish the pride of home and the family, and make the dwellers therein feel that—there is no place like home ; and further, which recognises that the greater number of women best serve the state and their families, and perform their highest duties in the home ; and that the home and the family is the unit and heart of the nation ; then we may expect a great re-action, so that the extinction of the race which is mathematically ominous will in the end be averted.

In spite of Koch's theory we have no reason to think that the natural fertility of the nation has yet suffered appreciably ; and it certainly has not amongst certain classes such as the Roman catholic sections of the community and Jews, miners, casual labourers ; nor amongst the more irresponsible classes and feeble-minded.

The greatest decline in the birth-rate is amongst the thrifty and skilled artizan and tradesman classes, and amongst the general middle and upper classes.

This again leads to the very important question, how is our declining birth-rate affecting the quality of the population ? For it is so far true that a reduced birth-rate may be compensated for, if at the same time the quality of the race is improved—" the character of every race of men is the real limit to its numbers in the world, if allowance be made for accidents of position and time." (Farr Census Reports, 1851.)

Hence, at no period in the world's history does each nation require her best men more than at the present moment, and as the history of ancient Greece and Rome shows that when once a nation has fallen into arrears as regards the quality of its stock, it cannot remake itself on demand ; it then becomes a question of supreme importance for each nation and its legislators to contemplate which elements of the population, and under what conditions they are reproducing themselves in the greatest numbers, and what is likely to be the result of any wrongly-directed selective birth-rate, which may be due to the reversal of the operation of the law of natural selection, on the integrity, stability and progress of the nation ; and finally how such vital questions are likely to be affected by the trend of modern legislation. In a study of this subject there is much that is interesting in the Report of the Poor Law Commission.

There are many other correlated factors such as the influence of birth-rate on the age-constitution of the people and consequently on the general and infantile death-rates. Also the effects of change in the age-constitution in altering the numbers of females of child-bearing age (15-45) ; combined with the effects of migration in different districts ; and the fertility of married females due to increasing postponement of time of marriage and decrease in the marriage rate and the effects of the continued decrease in illegitimacy.

In theory a continued high birth-rate in any community should so increase the proportion of the young and adult section amongst whom mortality is lowest, and consequently a high birth-rate should be associated with a low death-rate. But again, we have the opposite theory which holds that the birth-rate controls the death-rate ; if the former is high so will the latter owing to the greater mortality amongst infants.

We cannot here discuss these theories, nor their various modifications, such as the co-existance of high birth-rates with high death-rates or with low death-rates, and low birth-rates with low death-rates or high death-rates ; as all variations are found in practice in different communities. But it may be said that in the main the first theory should hold true unless so far as its operation is modified by other influences which in many places are numerous and often difficult to interpret.

Lancashire, as a County, has a low birth-rate, a high death-rate, and a high infantile mortality rate, and this expresses the chief features of many of its towns ; whereas in some Welsh towns both marriage, birth, and death-rates are all high. In Monmouthshire they are respectively as 17, 36·2, and 15·2, as compared with 7·7, 23, and 16·1 for Rochdale ; while in several counties in the south-east corner of England such as Surrey, Sussex, Essex and Kent all rates are extremely low.

But according to the Registrar General high and low fertility rates generally coincide with high and low proportions of young married women, and on account of migration from the rural to urban districts the proportion of young married women in the former is considerably below that in the latter. Hence, when corrected for age-constitution the fertility of married women in the country districts is not less but probably from 7 to 10 per cent. higher than that of women in towns.

As an important summary on this subject the following extract is taken from one of the Reports of the Registrar General :—

> The Registrar General states that approximately 70 per cent. of the decrease in the birth-rate during the last 35 years results from the decreased fertility of married women, which is due in part to changes in their age-constitution ; that about 10 per cent. may be ascribed to the decrease of illegitimacy (which has fallen since 1870-72 by about 28 per cent.), and that the remaining 20 per cent. is due to the decrease in the proportion of married women in the female population of conceptive ages. Apart from the variations in the physiological, social, and economic conditions of the people, and the greater use of artificial means to secure a restricted fertility, the principal factors that exert an influence on the birth-rate are (*a*) variations in the proportion of women of conceptive ages in the population ; (*b*) variations in the marriage-rate ; and (*c*) variations in the age-constitution of married women. Although the number of women of conceptive ages in proportion to the total population has increased

in the two last decennia, the proportion of married women aged 15-45 years to the total female population has not materially altered. On the other hand, the marriage-rate has fallen continuously since 1871, and the marriage age has been postponed, thus curtailing the period within which children can be born. During the last thirty years the actual rate of reproduction in the towns was some 15 to 18 per cent. greater than the rate in country districts, but the relative fertility of women living in the country was about 10 per cent. greater than that of women residing in towns.

Still Births.

According to the Registrar of the Cemetery 125 still-born children have been buried during the year under notice. The number of still-births notified to this department in accordance with the provisions of the Notification of Births Act, 1907, was 114.

Deaths.

The total number of deaths recorded for the Borough during the year was 1,442 ; males 699, females 743. This is not the actual number of deaths registered within the Borough, but includes 12 deaths of Rochdale residents which occurred in public institutions at Manchester, Oldham, Lancaster and Salford ; and 146 deaths which occurred in Dearnley Workhouse ; and excludes 17 deaths of persons dying in public institutions within the Borough and belonging to outside districts.

In Table II. are recorded the chief vital statistics of the different wards of the Borough ; and from a perusal of this table it will be seen that the death-rate from all causes was equal to 16·1 per 1,000 of the estimated population, or 2·3 per 1,000 less than the same rate for the previous year, and 1·4 less than the average death-rate for the preceding five years, 1904-1908. This is the crude death-rate, and is not corrected for age and sex distribution.

Corrected Death Rates.

As the number of persons living at each age period in any community has an important bearing on the death-rate of that community; and as we know the age and sex distribution varies considerably, it is necessary, before any fair comparison can be made, to correct the crude death-rate by a factor which equalises and places the different towns on the same population basis, as regards age and sex, as the whole of England and Wales, thus giving what is known as the corrected death-rate.

Examining the corrected death-rates of the seventy-six Great Towns of England and Wales (towns with over 50,000 of a population) as published by the Registrar General, we find that during the year 1908 Rochdale's corrected death-rate was 20·34, compared with 15·84 for the Seventy-Six Great Towns ; and was fourth from the highest rate on the list. The year under notice, however, showed a considerable improvement, the rate having fallen to 17.92, or sixteen below the highest. The same rate for the Seventy-six Great Towns was 15·57.

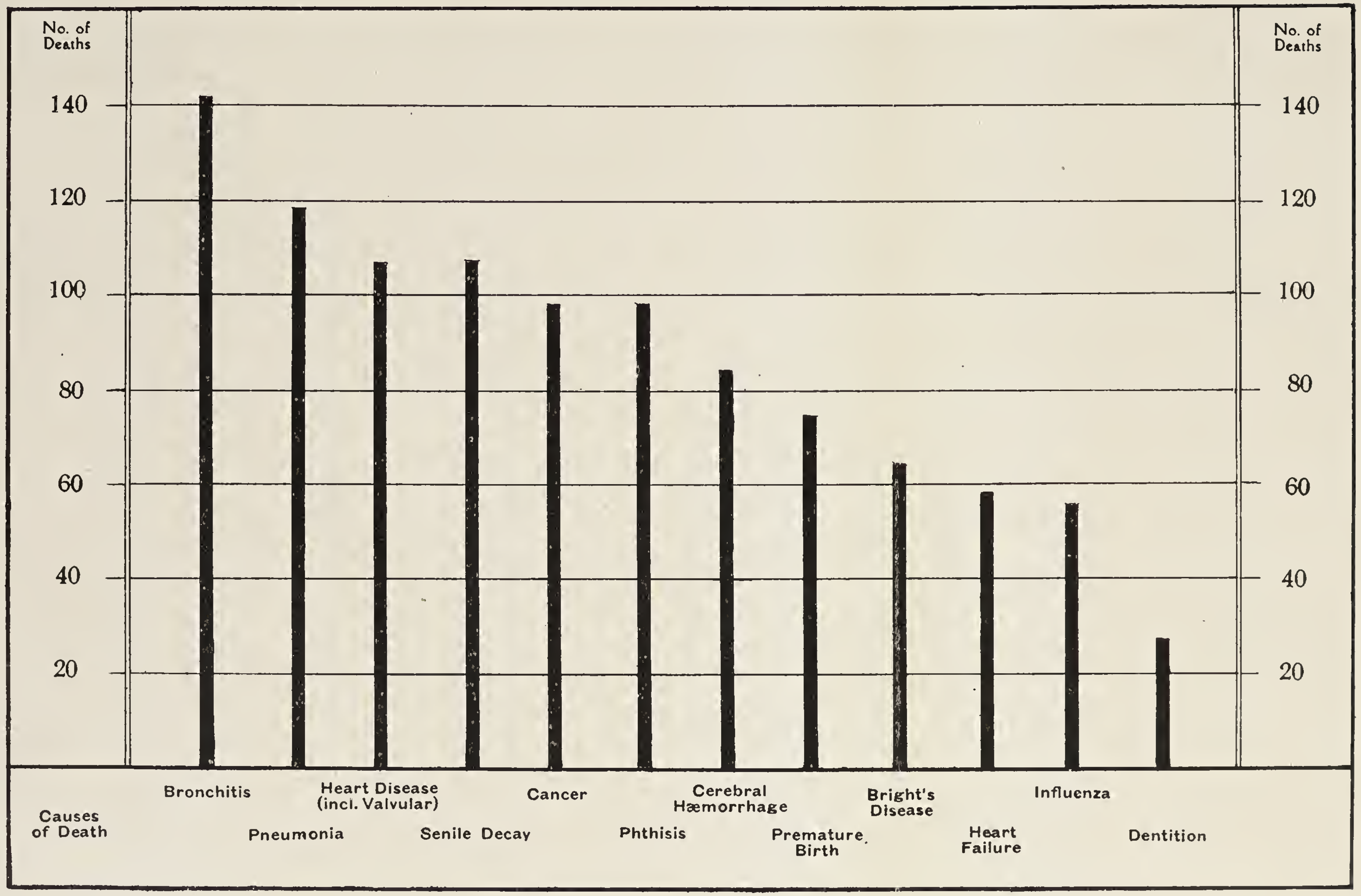
Comparing the corrected death-rate of Rochdale with the same rate for the 15 Lancashire Towns which are classed with the 76 Great Towns of England and Wales, we find that during 1908 12 towns had a lower and only two a higher rate. But during the year 1909 the rate of Rochdale had fallen to such an extent that only three towns—Preston, Bolton, and Barrow-in-Furness had a lower rate ; whilst Burnley, Bury, Blackburn, Bootle, Warrington, Salford, Manchester, St. Helens, Liverpool, Wigan and Oldham had a higher corrected death-rate.

The following Table shows the corrected death-rates of England and Wales, and average for similar towns to Rochdale.

Towns	Corrected Death-rate per 1,000 of Population		
	1909	1908	Average five years 1904-8.
England and Wales	14·49	14·65	15·31
England and Wales *less* 76 Great Towns ..	13·85	14·00	14·41
76 Great Towns	15·57	15·84	16·74
15 Lancashire Towns	19·07	18·71	19·61
ROCHDALE	17·92	20·34	19·32

CHART A .

Comparative view of the chief causes of death during the year 1909.



The Decline in the Death-rate.

The decline in the death-rate of Rochdale during the year 1909 is chiefly due to the low death-rate from zymotic diseases, which caused only 57 deaths as compared with 213 last year.

The death-rate from all causes, during the past 30 years was as follows :—

Years	Rate per 1,000
1879—1883...	20·3
1884—1888...	18·9
1889—1893...	19·4
1894—1898...	18·1
1899—1903...	18·8
1904—1908...	17·5

Comparing the different wards of the Borough, Table II., Wardleworth East Ward shows the highest death-rate 19·4 ; Castleton West is next with 19·3 ; and Castleton Moor the lowest rate, 12·8 per 1,000.

TABLE II.

DISTRICT.	Population. (Est. to middle of 1909.)	Acreage. *	Density per Acre.	Births Regist'd	Deaths.					Infantile Mortality per 1000 Births Registered.	Rate per 1,000 of Est. Population.				
					Total.	Under one year of age.	From 7 Principal Zymotic Diseases.	From Respiratory Diseases.	From Phthisis.		Births.	Deaths.	From 7 Principal Zymotic Diseases.	From Respiratory Diseases.	From Phthisis.
The Borough ...	**89654**	**6446**	**13·91**	**2063**	**1442**	**210**	**57**	**273**	**97**	**102**	**23·0**	**16·1**	**0·64**	**3·05**	**1·08**
Castleton East Ward	11078	471	23·50	‡270	144	17	2	23	9	†63	24·4	13·0	0·18	†2·08	0·81
,, South ,,	11052	439	25·18	247	‡181	31	5	29	12	126	22·3	16·4	0·45	2·63	1·09
,, North ,,	6784	263	25·79	†100	†101	†8	†1	22	9	80	†14·7	14·9	†0·15	3·24	1·33
,, West ,,	7477	394	18·98	183	144	16	‡9	23	9	87	24·5	19·3	1·20	3·08	1·20
,, Moor ,,	8221	2261	†3·64	210	105	20	3	24	6	95	25·5	†12·8	0·36	2·92	0·73
Spotland East ...	7459	676	11·03	136	126	13	5	21	8	96	18·2	16·9	0·66	2·81	1·08
,, West ...	8742	746	11·72	198	132	18	3	29	†4	91	22·7	15·1	0·34	3·32	†0·46
Wardleworth East ...	6086	354	17·19	156	118	17	6	27	9	109	25·6	‡19·4	0·99	‡4·44	1·48
,, West ...	6766	296	22·86	183	117	18	‡9	†19	10	98	‡27·1	17·3	‡1·33	2·81	1·48
,, South	8748	117	74·77	225	156	‡36	6	‡30	‡14	‡160	25·7	17·8	0·69	3·43	‡1·60
Wuerdle	7241	429	16·88	155	118	16	8	26	7	103	21·4	16·3	1·11	3·59	0·97

* Revised Figures for each Ward. † Lowest. ‡ Highest.

Classification of Causes of Death.

The deaths are classified from the Schedule of Causes of Death issued by the Incorporated Society of Medical Officers of Health.

In Tables III. and IX. the causes of death are classified and distributed into the various wards of the Borough, and according to age and sex. Table III. is a summary of the causes of death, and Table IX. a detailed and extended classification. According to Table IX. the chief causes in order of their numerical importance were Bronchitis (142), Pneumonia (118), Heart Disease (including Valvular) (107), Senile Decay (106),Cancer (98), Phthisis (97),Cerebral Hæmorrhage (85), Premature Birth (54),Brights Disease (43),Heart Failure (38), Influenza (35),and Dentition (26); and these are shown graphically in Chart A.

The death-rate from Respiratory diseases, such as Bronchitis and Pneumonia, in Rochdale and other Lancashire manufacturing towns is high ; Chart A., Table XVII. The analysis and discussion of this subject we have reserved for the Housing Report, in which will be seen not only the unequal distribution of these deaths over the Borough, but their very close association with certain areas.

COUNTY BOROUGH OF ROCHDALE.

TABLE III.

CAUSES OF, AND AGES AT DEATH DURING YEAR 1909.

(Local Government Board Return.)

Population (Est. 1909) 89,654. Acreage 6,446.

Schedule No.	CAUSES OF DEATH.	DEATHS at the subjoined ages of "Residents," whether occurring in or beyond the District. All Ages		Under 1 year		1-5		5-15		15-25		25-65		65 years and over		DEATHS at All Ages of "Residents" belonging to Wards, whether occurring in or beyond the District.											Total Deaths whether of "Residents" or "Non-Residents" in Public Institutions in the District
		M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Castleton North	Castleton South	Castleton East	Castleton West	Castleton Moor	Spotland East	Spotland West	Wardl'th East	Wardl'th West	Wardl'th South	Wuerdle	
1	Small-pox	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	Measles	8	9	3	...	5	7	...	2	...	...	...	...	...	...	...	...	1	...	...	2	...	3	3	4	4	...
3	Scarlet Fever	7	3	...	1	4	2	3	...	...	...	...	...	...	...	1	1	1	2	1	1	1	...	1	...	1	7
4	Typhus Fever	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	Epidemic Influenza	17	18	...	...	...	...	2	1	1	...	4	9	10	8	2	8	4	3	1	4	2	1	6	4	...	...
6	Whooping Cough	3	3	2	2	1	1	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	1	2	...
7	Diphtheria, Membranous Croup	7	6	1	...	3	4	2	2	1	...	...	...	...	...	...	2	...	6	...	...	1	1	2	1	...	7
8	Croup	2	1	...	...	2	1	...	...	...	...	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...
9	Enteric Fever	1	2	...	...	...	...	...	...	...	1	1	...	...	1	...	...	...	...	...	...	...	2	1	...	...	2
10	Asiatic Cholera	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	Diarrhœa, Dysentery	3	2	2	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	1	...	1	...
12	Epidemic or Zymotic Enteritis	2	1	2	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	1	...	...	...
13	Enteritis	6	8	3	2	2	1	...	...	...	...	1	3	...	2	1	1	2	2	2	...	1	1	...	3	1	...
14	Other Continued Fevers	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	Erysipelas	1	1	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	2	...	...	...
16	Puerperal Fever	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
17	Other Septic Diseases	3	3	1	...	...	...	...	...	1	1	1	2	...	...	1	1	1	...	...	...	1	...	...	2	...	...
18	Intermittent Fever and Malarial Cachexia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	Tuberculosis of Meninges	4	5	2	...	1	4	1	1	...	...	...	...	...	...	1	2	1	...	2	1	...	2	...	...	...	...
20	Tuberculosis of Lungs	60	37	...	...	2	...	2	2	8	3	43	29	5	3	9	12	9	9	6	8	4	9	10	14	7	1
21	Other Forms of Tuberculosis	12	7	1	...	6	2	1	...	1	2	3	3	...	...	1	3	3	2	...	3	1	3	1	1	1	3
22	Alcoholism	...	3	...	...	...	...	...	...	...	...	...	3	...	...	...	1	...	...	...	2	...	...	...	...	...	...
23	Cancer	35	63	...	...	...	...	...	...	...	...	25	40	10	23	7	16	14	10	9	4	13	5	6	9	5	6
24	Premature Birth	33	21	33	21	...	...	...	...	...	...	...	...	...	...	2	12	2	2	4	3	6	4	4	15	...	...
25	Developmental Diseases	43	36	34	26	9	10	...	...	...	...	...	...	...	...	4	5	10	9	7	4	4	9	8	11	8	1
26	Old Age	32	74	...	...	...	...	...	...	...	...	1	2	31	72	8	12	10	18	9	8	15	5	6	7	8	...
27	Meningitis	5	3	1	1	2	1	1	...	...	1	1	...	...	...	...	2	1	...	1	...	...	2	...	1	1	...
28	Inflamation and Softening of Brain	1	2	...	...	...	...	...	...	...	...	1	...	...	2	...	...	1	1	...	1	...	...	...	...	...	...
29	Organic Diseases of Heart	15	33	...	...	...	...	...	...	1	1	8	25	6	7	4	10	11	3	...	2	6	3	5	3	1	...
30	Acute Bronchitis	19	33	7	8	...	4	...	...	...	1	7	9	5	11	5	4	5	4	3	6	6	5	5	8	2	...
31	Chronic Bronchitis	36	54	...	...	...	...	...	1	...	...	12	20	24	33	8	13	6	6	5	6	9	8	7	9	12	...
32	Lobar (Croupous) Pneumonia	11	4	...	...	...	...	...	...	...	...	10	...	1	4	...	3	...	2	6	2	1	1	...	...	...	2
33	Lobular (Broncho) Pneumonia	22	28	8	12	10	8	3	1	...	...	1	4	...	3	3	4	4	2	7	4	6	4	5	7	4	3
34	Diseases of Stomach	9	9	1	1	1	...	...	2	1	2	3	2	3	2	2	1	2	2	1	1	1	4	1	1	2	4
35	Obstruction of Intestines	11	4	...	...	...	...	...	1	...	...	5	2	6	1	3	...	...	...	...	3	2	3	1	2	1	8
36	Cirrhosis of Liver	4	3	...	...	...	...	...	...	...	...	3	2	1	1	...	...	1	1	...	2	...	...	2	1	...	...
37	Nephritis and Brights Disease	27	25	...	...	...	...	...	1	...	1	23	14	4	9	5	3	3	7	3	2	3	6	6	4	10	1
38	Tumours and Other Affections of Female Genital Organs	...	4	...	...	...	...	...	...	...	...	...	4	...	...	...	...	1	...	...	...	1	...	1	...	1	...
39	Accidents and Diseases of Parturition	...	7	...	...	...	...	...	...	...	...	...	7	...	...	...	...	...	1	2	...	2	...	...	1	1	1
40	Deaths by Accident or Negligence	16	11	1	1	2	5	2	2	2	...	8	2	1	1	1	1	2	3	2	3	3	1	3	3	5	12
41	Deaths by Suicide	8	5	...	...	...	...	...	...	...	1	8	4	...	...	1	1	1	1	1	1	1	2	...	2	2	2
42	Deaths from Ill-defined Causes	2	4	...	2	...	...	...	...	...	1	2	1	...	...	1	1	1	...	...	...	...	1	...	2	...	1
43	ALL OTHER CAUSES. Diseases of the Brain and Nervous System	18	25	2	...	1	...	...	1	...	2	12	16	3	6	4	7	5	4	...	3	5	4	3	5	3	...
	Apoplexy and Hemiplegia	24	28	...	...	...	...	...	...	...	...	14	15	10	13	3	2	2	7	2	3	5	5	8	6	9	...
	Diseases of Heart and Circulatory System	94	81	...	...	...	...	...	2	...	2	56	42	38	35	14	27	19	13	16	28	14	10	11	11	12	7
	Diseases of Respiratory System	39	24	3	1	2	5	3	1	3	1	24	13	4	3	6	4	6	9	3	3	7	9	2	6	8	2
	Diseases of the Urinary System	10	2	...	...	...	...	...	...	...	...	3	1	7	1	...	3	1	2	...	2	1	1	...	...	2	2
	Diseases of the Digestive System	9	10	...	...	1	...	1	2	2	...	4	6	1	2	...	3	5	2	2	1	3	...	...	2	1	7
	Venereal Diseases	3	4	1	3	1	1	...	...	...	...	1	...	...	...	...	1	1	1	1	...	...	1	...	2	...	...
	Convulsions	18	6	13	5	3	1	1	...	...	...	1	...	...	...	1	4	...	4	3	4	2	...	3	3	...	...
	Other Causes	19	30	...	...	...	1	2	1	1	7	12	15	4	6	3	8	6	5	3	7	4	3	2	5	3	4
	ALL CAUSES	699	743	121	89	59	58	24	23	22	28	299	296	174	249	101	181	144	144	105	126	132	118	117	156	118	83

Comparative Mortality.

The following Table IV. shows the mortality from the principal groups of diseases during 1909, compared with the mortality during the preceding five years.

TABLE IV.

Causes of Death	1909	1908	1907	1906	1905	1904
Diseases of Digestive System	73	75	68	88	85	78
,, Respiratory System	273	272	316	245	233	302
,, Circulatory System	275	252	285	266	292	252
,, Urinary System	64	84	78	69	72	55
,, Brain and Nervous System	78	85	79	92	86	106
Zymotic Diseases (excluding Diarrhœa)	49	127	83	111	70	123
Tubercular Diseases (including Phthisis)	125	166	169	153	154	136
Developmental and Wasting Diseases (excluding Premature Birth)	79	94	66	73	85	83
Diarrhœal Diseases............................	8	88	10	51	45	55
Premature Birth	54	55	45	63	46	36
Other Causes	364	334	294	320	275	291
All Causes	1,442	1,632	1,493	1,531	1,443	1,517

Comparing the death-rates of these groups of diseases with the average for the preceding five years, as set out in Table V., the past year showed that the death-rate from the following groups was under the average ; diarrhœal diseases (by 84 per cent.) ; zymotic diseases (by 64 per cent.) ; tubercular diseases (by 22 per cent.); diseases of the brain and nervous system (by 15 per cent.) ; diseases of urinary system (by 13 per cent.) ; diseases of the digestive system (by 10 per cent.) and diseases of respiratory system (by 3 per cent.), while the death-rate from premature birth was above the average (by 7 per cent.). The rates from diseases of the circulatory system, and developmental and wasting diseases were equal to the average.

The chief features of the year's statistics were therefore the low rates from zymotic diseases (chiefly diarrhœal diseases) and tubercular diseases.

Mortality at Different Ages.

The number of deaths at each age period was as follows :—

Under 1 year	(pre school period)	... 210
1—5 years	,, ,, ...	... 117
5—15 ,,	(school period) ...	... 47
15—25 ,,	(adolescent period)	... 50
25—65 ,,	(mature period) ...	... 595
Over 65 years	(post-mature period)	... 423

Comparing the death-rates at these age periods (Table VI.) for the preceding five years we find that the rate at the " pre-school " period was greatly below the average, and greatly below the rate of any of the five years 1904-1908. At the " school," " adolescent," and " mature " age periods the rate was slightly below the average. The rate at the " post-mature " age period was above the average.

TABLE V.

Abstract of Meteorology and Mortality during 1904-1909.

YEAR	METEOROLOGY								MORTALITY. (Expressed as Annual Death Rate per 10,000 of Population.)										
	Mean Barometric Pressure (reduced).	Tem-perature.		Mean Humidity (Sat. 100)	Rain		Wind.		All Causes	Diarrhœa (Incl. Epd. & Zym. Enteritis)	Other Zymotic Diseases	Tuberculous Diseases (Chiefly Phthisis)	Diseases of—					Developmental and Wasting Diseases	Premature Birth
		Mean	Daily Range		No. of days it fell.	Amount	Prevailing Directions	Velocity—Miles per hour					Digestive System	Respiratory System (Excl. Phthisis)	Circulatory System	Urinary System	Brain and Nerv'us Sys'm		
1909	*29·933	‡46·3	12·6	‡86·3	206	S. & R. 48·545	S.W., N.E. W., N.W.	6·87	‡160·8	‡0·89	‡5·46	‡13·94	8·14	30·46	30·68	7·13	‡8·70	8 81	6·02
1908	‡29·917	*48·0	13·0	91·4	‡190	S. & R. 41·265	S.W., N.E. N.W.	‡5·32	*183·7	*9·90	14·30	18·69	8·44	30·63	‡28·37	*9·45	9·57	*10·58	6·19
1907	29·868	47·2	12·8	*91·7	*236	S. & R. 47·190	S.W., N.E. N.W.	6·72	169·7	1·13	9·43	*19·20	‡7·72	*35·91	32·38	8·86	8·97	‡7·49	5·11
1906	29·880	47·8	‡12·1	90·0	232	S. & R. *48·725	S.W., N.E. N.W.	5·45	175·6	5·84	12·74	17·54	*10·09	28·10	30·52	7.91	10·55	8·37	*7·22
1905	29·907	47·7	12·6	89·3	207	S. & R. 37·079	S.W., N.E. N.W., W.	6·42	167·0	5·20	8·10	17·82	9·83	‡26·98	*33·80	8·33	9·95	7·75	5·32
1904	29·882	47·5	*13·4	88·4	209	S. & R. ‡36·414	S.W., N.E. W., N.W.	*7·15	177·2	6·42	*14·36	15·88	9·11	35·28	29·43	‡6·42	*12·38	9·69	‡4·20
Means 1904-1908	29·891	47·6	12·8	90·2	215	S. & R. 42·135	S.W., N.E. N.W.	6·21	174·6	5·70	11·79	17·83	9·04	31·38	30·90	8·19	10·28	8·78	5·61

* Highest. ‡ Lowest.

TABLE VI.

Mortality from all causes according to Age.

YEAR	AGE PERIODS Under 5 years (Pre-school period)	5—15 years (School period)	15—25 years (Adolescent period)	25—65 years (Mature period)	Over 65 years (Post-mature period)	ALL AGES
1909	36·04	2·85	2·83	13·78	129·60	16·08
1908	59·52	3·37	3·09	13·79	123·07	18·38
1907	46·27	3·71	3·58	14·63	105·81	16·97
1906	48·85	3·99	3·55	15·03	108·38	17·56
1905	41·52	3·52	3·23	14·42	117·33	16·70
1904	55·41	3·24	3·68	13·73	114·89	17·72
Average 1904-1908	50·31	3·57	3·43	14·32	113·90	17·47

Table VII. gives the population and number of births and deaths in each Registration Sub-district during the present year and preceding eight years. This Table is made up into Registration Districts owing to the figures for the various wards not being available.

TABLE VII.

VITAL STATISTICS of separate Localities (Registration Sub-Districts) in 1909 and previous Years.

Local Government Board Return.

YEAR.	* CASTLETON No. 1.				† CASTLETON No. 2.				SPOTLAND.				WARDLEWORTH.				WUERDLE.			
	Population, estimated to middle of the year.	Births Registered.	Deaths at all ages.	Deaths under One Year.	Population, estimated to middle of the year.	Births Registered.	Deaths at all ages.	Deaths under One Year.	Population, estimated to middle of the year.	Births Registered.	Deaths at all ages.	Deaths under One Year.	Population, estimated to middle of the year.	Births Registered.	Deaths at all ages.	Deaths under One Year.	Population, estimated to middle of the year.	Births Registered.	Deaths at all ages.	Deaths under One Year.
1901	20507	484	382	76	20192	450	334	62	15230	306	268	39	20272	504	404	76	6913	159	141	22
1902	20733	513	398	76	20447	498	333	50	15405	318	275	34	20486	558	378	79	6986	158	117	21
1903	21033	549	346	73	20607	460	352	68	15565	342	232	42	20603	559	404	88	7016	161	121	14
1904	21203	506	376	87	20817	439	351	50	15695	305	270	48	20829	551	404	86	7056	149	116	25
1905	21356	450	366	62	21049	473	338	53	15818	317	254	33	21083	528	386	92	7084	112	99	11
1906	21478	545	368	80	21454	473	361	60	15950	333	277	52	21201	547	407	76	7107	160	118	17
1907	21646	495	372	68	21910	534	365	57	16047	347	258	44	21277	556	356	57	7120	165	142	27
1908	21926	573	396	105	22164	520	355	74	16105	362	297	57	21464	588	454	116	7161	159	130	19
Av'rage 8 years 1901-1908	21235	514	375	78	21080	481	349	59	15727	329	266	44	20902	549	399	84	7055	178	123	20
1909	22130	517	325	48	22482	493	350	44	16201	334	258	31	21600	564	391	71	7241	155	118	16

* Castleton East and South Wards. † Castleton North, West, and Moor Wards.

Table VIII. sets forth the estimated population, birth and death-rates for the whole Borough, and particulars of deaths in public institutions within and beyond the district, during 1909 and previous ten years.

Coroner's Inquests and Enquiries.

Inquests or enquiries were held during the year concerning 134, or 9·2 per cent. of the total deaths. These were classified according to the supposed cause given on Coroner's certificate. The percentage last year was 7·5.

TABLE VIII.

VITAL STATISTICS of Whole District during 1909 and previous Years.

Local Government Board Return.

YEAR	Population estimated to Middle of each Year	BIRTHS		TOTAL DEATHS REGISTERED IN THE DISTRICT				TOTAL DEATHS IN PUBLIC INSTITUTIONS IN THE DISTRICT	Deaths of Non-residents registered in Public Institutions in the District	Deaths of Residents registered in Public Institutions beyond the District	NETT DEATHS AT ALL AGES BELONGING TO THE DISTRICT	
				Under 1 year of Age		At all Ages						
		Number	*Rate	Number	Rate per 1,000 Births registered	Number	*Rate				Number	*Rate
1	2	3	4	5	6	7	8	9	10	11	12	13
1899	75,180	1,838	24·4	319	173	1,423	18·9	25	5	133	1,551	20·6
1900	75,652	1,799	23·8	301	167	1,399	18·5	30	4	124	1,519	20·1
1901	83,114	1,903	22·9	275	144	1,403	16·9	40	8	134	1,529	18·4
1902	84,057	2,045	24·3	260	127	1,396	16·6	47	9	118	1,505	17·9
1903	84,824	2,071	24·4	283	137	1,328	15·7	37	10	137	1,455	17·1
1904	85,600	1,950	22·8	295	151	1,381	16·1	60	12	148	1,517	17·7
1905	86,390	1,880	21·8	250	133	1,305	15·1	51	13	151	1,443	16·7
1906	87,190	2,058	23·6	284	139	1,379	15·8	82	15	167	1,531	17·6
1907	88,000	2,097	23·8	253	121	1,340	15·2	68	11	164	1,493	17·0
1908	88,820	2,202	24·8	371	168	1,482	16·7	65	13	163	1,632	18·4
Averages for years 1899-1908	83,883	1,984	23·7	289	146	1,384	16·6	50	10	144	1,517	18·2
1909	89,654	2,063	23·0	210	102	1,301	14·5	66	17	158	1,442	16·1

* Rates in columns 4, 8, and 13 calculated per 1,000 of the estimated population.

NOTE.—The deaths included in column 7 of this Table are the whole of those registered during the year as having actually occurred within the district. The deaths included in column 12 are the number in column 7, corrected by the subtraction of the number in Column 10 and the addition of the number in Column 11.

By the term "Non-residents" is meant persons brought into the district on account of sickness or infirmity, and dying in public institutions there; and by the term "Residents" is meant persons who have been taken out of the district on account of sickness or infirmity, and have died in public institutions elsewhere.

The "Public institutions" taken into account for the purposes of these tables are those in which persons are habitually received on account of sickness or infirmity, such as hospitals, workhouses and lunatic asylums.

Area of district in acres (exclusive of area covered by water) 6,333. Total population at all ages, 83,114. Number of inhabited houses, 20,191. Average number of persons per house, 4·1.—At Census of 1901.

Graphic Chart B.

Weekly number of Deaths and Meteorology.

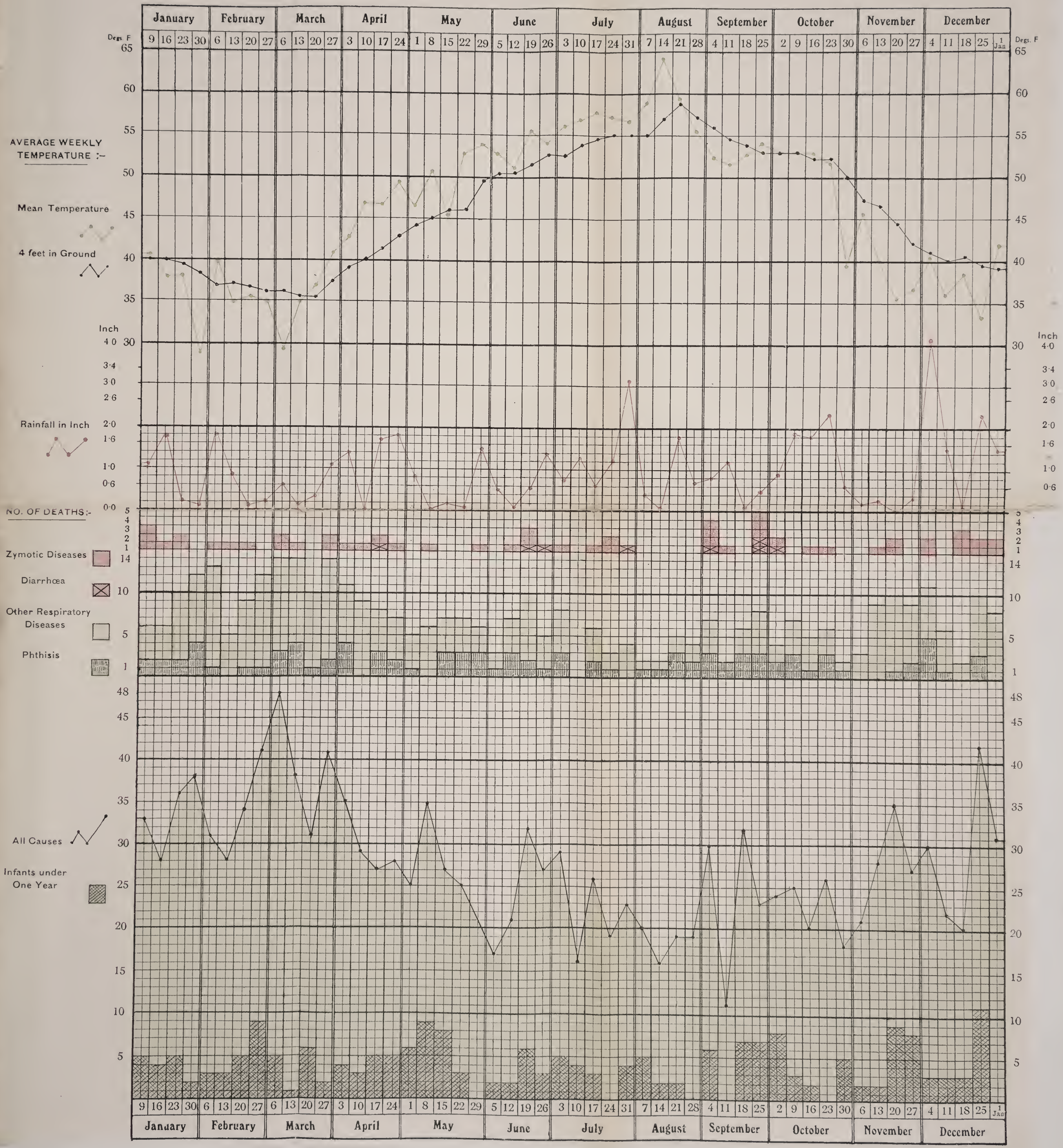


TABLE IX.

Causes of, and Ages at Death during the Year 1909.

CAUSES OF DEATH.	DEATHS at the subjoined Ages of "Residents," whether in or beyond the District.																												DEATHS at all Ages of "Residents" belonging to Wards, whether occurring in or beyond the District.											Total Deaths whether of "Residents" or "Non-Residents" in Public Institutions in the District
	All Ages		Under 1 Year		1—		5—		10—		15—		20—		25—		35—		45—		55—		65—		75—		85 years and over.		Castleton North	Castleton South	Castleton East	Castleton West	Castleton Moor	Spotland East	Spotland West	Wardleworth East	Wardleworth West	Wardleworth South	Wuerdle	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.												
I.—Zymotic Diseases	31	26	10	6	14	14	5	2	...	2	1	1	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	1	5	2	9	3	5	3	6	9	6	8	16
II.—Tubercular Diseases	76	49	3	...	9	6	2	...	2	3	5	2	4	3	7	13	20	9	8	5	11	5	4	3	1	...	...	...	11	17	13	11	8	12	5	14	11	15	8	4
III.—Developmental and Wasting Diseases	76	57	67	47	9	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	17	12	11	11	7	10	13	12	26	8	1
IV.—Diseases of the Brain and Nervous System	42	36	16	6	6	2	2	1	...	...	...	...	...	3	3	3	3	5	3	7	6	1	3	6	...	1	...	1	5	13	7	9	4	8	7	6	6	9	4	...
V.—Diseases of the Heart and Circulatory System	133	142	...	...	...	...	...	...	...	2	...	2	1	1	3	8	10	5	22	27	43	42	43	43	11	12	...	...	21	39	32	23	18	33	25	18	24	20	22	7
VI.—Diseases of the Respiratory System	129	144	18	21	14	18	3	1	3	2	3	1	...	1	9	4	7	8	14	7	24	27	26	29	8	22	...	3	22	29	23	23	24	21	29	27	19	30	26	7
VII.—Diseases of the Digestive System	39	34	4	3	4	1	1	5	...	...	...	1	3	1	4	2	3	2	2	1	7	10	8	5	3	3	...	...	6	5	10	7	5	7	7	8	4	9	5	19
VIII.—Diseases of the Urinary System	37	27	...	...	...	...	...	1	...	...	...	...	...	1	2	1	8	6	10	3	6	5	11	6	...	4	...	...	5	6	4	9	3	4	4	7	6	4	12	3
IX.—Accidents and Suicides	24	16	1	1	2	5	1	2	1	...	...	...	2	1	3	3	4	1	4	2	5	...	1	...	...	1	...	...	2	2	3	4	3	4	4	3	3	5	7	14
X.—Miscellaneous	112	212	2	5	1	2	3	...	1	2	1	3	2	7	4	12	9	18	13	23	21	31	28	47	24	52	3	10	22	48	38	38	26	25	38	16	23	32	18	12
ALL CAUSES	699	743	121	89	59	58	17	12	7	11	10	10	12	18	35	46	64	54	77	75	123	121	124	140	47	95	3	14	101	181	144	144	105	126	132	118	117	156	118	83
I.—Zymotic Diseases—																																								
Measles	8	9	3	...	5	7	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	3	3	4	4	...
Scarlet Fever	7	3	...	1	4	2	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	2	1	1	1	...	1	...	1	7
Whooping Cough	3	3	2	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	1	2	...
Diphtheria, Mem. Croup	7	6	1	...	3	4	2	1	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	6	...	...	1	1	2	1	...	7
Enteric Fever	1	2	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2	1	...	...	2
Diarrhœa, Dysentery	3	2	2	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	1	...	1	...
Epidemic or Zymotic Enteritis	2	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	1	...	...	...
II.—Tubercular Diseases—																																								
Tuberculosis of Brain, Acute Hydrocephalus	4	5	2	...	1	4	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	1	...	2	1	...	2	...	...	...	...
Tuberculosis of Lungs	60	37	...	...	2	...	1	...	1	2	4	1	4	2	7	13	19	7	7	4	10	5	4	3	1	...	...	...	9	12	9	9	6	8	4	9	10	14	7	1
Tuberculosis of Intestines, Tabes Mesenterica	7	2	1	...	4	...	...	...	...	...	1	1	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	2	2	1	...	...	1	...	1	1	1	1
General Tuberculosis	3	4	...	...	1	1	...	...	1	...	...	...	...	1	...	...	1	2	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	2	...	2	...	...	...	...
Other Forms of Tuberculosis	2	1	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	1	...	...	...	2
III.—Developmental and Wasting Diseases—																																								
Premature Birth	33	21	33	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	12	2	2	4	3	6	4	4	15	...	...
Debility at Birth	8	7	8	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	5	...	2	2	1	...	3	1	...
Atelectasis	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
Congenital Defects	5	8	4	7	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	3	...	1	1	1	1	1	1
Want of Breast Milk	1	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...
Atrophy, Debility, Marasmus	12	6	12	5	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	2	1	1	...	2	3	3	1	...
Dentition	16	10	9	5	7	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	2	2	...	3	1	...	5	3	3	5	...
Rickets	1	3	...	...	1	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	1	1	...	...
IV.—Diseases of the Brain and Nervous System—																																								
Convulsions	18	6	13	5	3	1	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	4	...	4	3	4	2	...	3	3	...	...
Meningitis	5	3	1	1	2	1	1	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	1	...	...	2	...	1	1	...
Softening of Brain	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	...	...	...	...	...	1	1	...	1	...	...	...	...	...	...
General Paralysis of Insane	3	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	2	...	...	...	...	...	...	...	...	...	2	...	...	...	1	1	...	1	...	...
Other forms of Insanity	2	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	2	3	...	1	...	1	2	1	1	...	...	1	1	1	...	2	...	...
Cerebral Tumour	3	2	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...	...	1	1	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	1	1	1	...
Epilepsy	1	5	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...	2	1	...	...	...	...	...	...	...	...	2	1	2	...	...	1	...	...	...	...	...
Laryngismus Stridulus	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
Locomotor Ataxy	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
Paraplegia, Diseases of Spinal Cord	3	8	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	2	1	1	1	1	1	1	...	...	...	...	...	3	1	1	...	...	1	2	...	1	2	...
Other & ill-defined Diseases of Brain & Nervous System	4	1	2	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	1	...	...	...	...	...	...	...	...	1	1	...	...	...	1	1	...	1	...	...	...
V.—Diseases of the Heart and Circulatory System—																																								
Cerebral Hæmorrhage	41	44	...	...	...	...	...	...	...	...	...	...	...	...	...	1	3	...	9	7	13	15	10	16	6	5	...	...	3	8	6	9	7	10	8	7	7	10	10	1
Hemiplegia, Brain Paralysis	7	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	3	2	3	4	5	...	1	...	...	2	...	1	3	2	...	2	1	4	2	2	...
Pericarditis	1	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...
Heart Disease (incl. valvular)	51	56	...	...	...	...	...	...	...	...	...	1	1	...	2	6	3	5	8	10	16	17	19	14	2	3	...	...	11	17	17	9	5	16	8	6	9	4	5	3
Heart Failure	16	22	...	...	...	...	...	...	...	1	...	1	...	1	...	1	2	...	2	5	5	4	5	7	2	2	...	...	3	8	4	1	3	4	4	2	2	3	4	...
Aneurism	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
Senile Gangrene	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	1
Embolism, Thrombosis	4	3	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	2	2	1	...	...	1	...	...	1	2	...	...	...	1	1	1	...	1	...	1
Phlebitis	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
Other & ill-defined Diseases of Heart & Circulatory System	11	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	1	4	1	3	...	1	...	...	...	1	2	2	1	1	2	1	1	1	...	1	...
VI.—Diseases of the Respiratory System—																																								
Laryngitis	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...
Croup	2	1	...	...	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...
Acute Bronchitis	19	33	7	8	...	4	...	...	...	...	...	...	...	1	1	1	...	2	2	...	4	6	3	6	2	4	...	1	5	4	5	4	3	6	6	5	5	7	2	...
Chronic Bronchitis	36	54	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2	3	3	9	15	19	20	5	13	...	...	8	13	6	6	5	6	9	8	7	10	12	...
Lobar, Croupous, Acute Pleuro Pneumonia	11	4	...	...	...	...	...	...	...	...	...	...	...	...	3	...	2	...	2	...	3	...	1	1	...	2	...	1	...	3	...	2	6	2	1	1	...	...	...	2
Lobular, Catarrhal, Broncho-Pneumonia	22	28	8	12	10	8	2	...	1	1	...	...	...	...	...	1	...	...	...	1	1	2	...	1	...	2	...	...	3	4	4	2	7	4	6	4	5	7	4	3
Pneumonia (form not stated)	34	19	3	1	2	4	...	1	2	...	3	1	...	...	5	2	5	3	7	2	5	2	2	1	...	1	...	1	5	3	5	9	1	2	6	7	1	6	8	2
Pleurisy	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...
Other and ill-defined Diseases of Respiratory System	3	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	2	1	...	1	...	...	...	...	...	1	...	2	1	1	2	...	...	...	...
VII.—Diseases of the Digestive System—																																								
Ulcer of Stomach and Duodenum	4	5	...	...	...	...	...	1	...	...	...	1	1	1	1	2	1	...	1	...	...	...	...	...	...	...	...	...	...	...	2	1	1	...	1	2	1	1	...	4
Other Diseases of Stomach	4	4	1	1	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	1	...	...	2	1	...	1	...	1	...	2	...	...	2	...
Enteritis	6	8	3	2	2	1	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	2	...	1	...	1	...	...	1	1	2	2	2	...	1	1	...	3	1	...
Appendicitis	5	2	...	...	...	...	1	1	...	...	...	...	2	...	2	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	1	1	1	...	2	...	...	1	...	5
Obstruction of Intestine	11	4	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	...	3	2	4	...	2	1	...	...	3	...	...	...	...	3	2	3	1	2	1	8
Cirrhosis of Liver	4	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	1	1	...	...	...	...	...	...	1	1	...	2	...	...	2	1	...	...
Other Diseases of Liver	1	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	3	1	...	...	...	...	...	...	...	4	...	...	...	1	...	...	...	...	1
Peritonitis	2	3	...	...	1	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	1	...	...	...	...	...	2	...	1	...	1	...	...	...	...	1	1
Other and ill-defined Diseases of Digestive System	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...
VIII.—Diseases of the Urinary System—																																								
Acute Nephritis	6	3	...	...	...	...	...	1	...	...	...	...	...	...	1	...	2	1	2	1	...	...	1	...	...	...	...	...	...	1	...	2	...	...	...	2	2	1	1	1
Brights Disease	21	22	...	...	...	...	...	...	...	...	...	...	...	1	...	1	6	4	7	2	5	5	3	5	...	4	...	...	5	2	3	5	3	2	3	4	4	3	9	...
Diseases of Bladder and Prostate	6	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	5	1	...	...	...	...	...	2	1	1	...	...	1	1	...	...	1	1
Other and ill-defined Diseases of Urinary System	4	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	1	...	2	...	...	...	...	...	...	1	...	1	...	2	...	...	...	...	1	1
IX.—Accidents and Suicides—																																								
Accidents—In Mines	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
In Vehicular Traffic	2	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	...	...	...	...	1
On Railways	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
By Machinery	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1
Burns and Scalds	1	6	1	...	...	4	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	1	1	...	...	1	1	...	2	7
Poisons	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...
Surgical Narcosis	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
Drowning	3	1	...	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	...	...	1	...
Suffocation, Overlaying	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
Suffocation, otherwise	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
Falls, not specified	3	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	1	...	...	1	...	...	...	...	...	...	...	1	...	...	...	2	...	1	...	...	1
Otherwise and not stated	1	1	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1
Suicides—By Poison	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	1
By Hanging and Strangulation	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	4	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	...	1	1	...
By Drowning	2	3	...	...	...	...	...	...	...	...	...	...	...	1	...	2	2	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	1	...	1	1	...
By Cut or Stab	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1
X.—Miscellaneous Causes—																																								
Epidemic Influenza	17	18	...	...	...	...	1	...	1	1	...	...	1	...	1	1	...	1	1	2	2	5	6	7	3	1	1	...	2	8	4	3	1	4	2	1	6	4	...	...
Syphilis	3	4	1	3	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	1	1	1	...	...	1	...	2	...	...
Erysipelas	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...
Puerperal Fever	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
Pyæmia, Septicæmia	2	1	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	1	...	...
Septic, Ulcerative, or Infective Endocarditis	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
Other Allied Diseases	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...
Rheumatic Fever	2	9	...	...	...	1	...	...	...	...	...	1	...	3	...	2	1	1	...	1	1	...	...	...	...	...	...	...	...	2	...	1	1	...	1	1	1	1	3	...
Chronic Alcoholism	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	2	...	...	...	...	...	...
Lead Poisoning	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
Osteo-arthritis, Rheumatoid Arthritis	1	5	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	2	...	...	1	1	...	...	2	...	1	...	...	2	...	...	...	1	...	...
Gout	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
Cancer	35	63	...	...	...	...	...	...	...	...	...	...	...	...	...	2	4	7	8	16	13	15	8	16	2	6	...	1	7	16	14	10	9	4	13	5	6	9	5	6
Diabetes Mellitus	6	7	...	...	...	...	...	...	...	...	1	...	...	1	...	...	1	...	...	2	1	2	2	1	1	1	...	...	1	2	2	2	1	3	...	1	...	1	...	...
Purpura Hæmorrhagica	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
Old Age, Senile Decay	32	74	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	12	20	17	43	2	9	8	12	10	18	9	8	15	5	6	7	8	...
Otitis, Otorrhœa	2	1	...	...	...	...	2	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...	3
Diseases of Lymphatic System and Ductless Glands	1	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	2	...	...	...	...	...	2	...	...	...	2	...	...	...	...	...	...
Diseases of Ovaries	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
Diseases of Uterus and Appendages	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...
Placenta Prævia, Flooding, Accidental Hæmorrhage	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...
Other and ill-defined Accidents and Diseases of Pregnancy and Childbirth	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	...	1	1	1
Other and ill-defined Diseases of Osseous System	1	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	1
Sudden Death (Cause not ascertained)	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
Anæmia, Leucocythæma	4	3	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	...	...	1	3	...	...	...	...	...	...	...	1	1	...	...	...	1	1	1	2	...	...
Other ill-defined and Not Specified Causes	1	4	...	2	...	...	...	...	...	...	...	1	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	1	...	2	...	1

Graphic Chart.

In the accompanying Chart B are set out graphically the weekly number of deaths from all causes, zymotic diseases, phthisis and other respiratory diseases ; and infants under one year of age ; also the weekly rainfall, air temperature, and four-foot earth temperature. An examination of this Chart shows that the death-rate from all causes was high during the first three months of the year, reaching its highest point in the first week in March, and its lowest in the second week in September.

The number of deaths from respiratory diseases reached their maximum during the two first weeks and last week in March, following a period of very cold weather with little rainfall—the mean temperature of the air, about 35° F. during the last three weeks in February, and as low as 29·7 in the first week of March ; while the minimum number of deaths occurred in the month of August, the hottest month of the year, when both the air and earth temperature reached their maximum—58·8° and 55·1° F. respectively.

The weekly deaths from zymotic diseases show no marked variation except in the month of August, when no deaths occurred from these diseases.

The almost entire absence of deaths from diarrhœal diseases in the third quarter of the year may be noted ; and which is referred to in another section of this report. The lower vertical columns show the weekly number of deaths of infants, but no extreme variations occurred during the year.

Chief Meteorological Features.

Table V. records the meteorological conditions for the past year and preceding five years. It will be observed that the weather as a whole during the past year, was slightly cooler than usual, the mean temperature being 46·3° F., as compared with 48·0 in 1908, and 47·6 the average for the preceding five years. The coldest months of the year were January and February, with a mean temperature of 36·4 and 36·2 respectively. The lowest reading of the grass thermometer was 10° F. on December 22nd, the next being 11° F. on 28th January, and 11·7° F. on March 5th. The lowest reading of the minimum shade thermometer was 17°.F. on January 28th, and the highest reading of the maximum shade thermometer was 81° F. on August 9th. The mean weekly temperature was lowest during the last week in January and last week in March with 29·0 and 29·7° F. temperature respectively.

The highest corrected barometric pressure was 30·755 on 10th March, and the lowest 28·464 on December 3rd.

Rain was measured on 206 days, and the rainfall amounted to 48·545 inches, as compared with 41.265 the previous year, and 42·135 the average for the five years 1904-8. December was the wettest month of the year with 8·37 inches, October coming next with 6·76 inches. The greatest fall was 1·775 inches on December 2nd, and the next 1·015 on October 3rd.

The prevailing winds were from South West, North East, West.

Infantile Mortality.

During the year under review—1909, cards containing nearly 50 items of information concerning each birth and each death of infants under one year of age were filled up by the Lady Health Visitors.

There were 2,069 births notified during the year, in accordance with the provisions of the Notification of Births Act, 1907, and particulars were obtained for 2,066 of these cases. The remaining three births occurred in Dearnley Workhouse, and information could not be obtained ; one is still in the Workhouse, and the other two have left the district.

The number of houses affected was 2,036, and the number of twin births was 30 ; six of which occurred in Wardleworth South Ward and five in Castleton South Ward.

From this vast accumulation of interesting material an attempt has been made by process of analysis to reach some of the fundamental conditions and causes which determine infantile mortality rates, and a report embodying this work has been prepared. But in consideration of its dimensions it has been considered expedient to postpone its publication meantime ; and consequently it will not be included in this report, although we hope it may follow at a later date in the form of a special report, or be incorporated in the next Annual Report. Hence, for the present this part will be very brief.

Table X. contains a summary of the infantile death statistics for 1909. In the first five vertical columns it will be seen that there were 210 deaths, 121 males and 89 females ; of whom 194 were legitimate and 16 illegitimate ; and of the whole 85 were insured. Also the causes of death are represented under six headings, and in the same columns will be seen the numbers of infants who died from the respective diseases under those headings.

The following 16 vertical columns give the numbers dying during each of the first four weeks of life, and for each month of the first year of life. They are further sub-divided to show the extent to which different types of feeding are practiced, and in the column " no food " are given the numbers who were unable to take any food after birth, and who die chiefly during the first week of life.

The Table also shows the distribution of the deaths to the different wards, and the number of deaths for each quarter of the year ; while the causes of death and the numbers dying from such causes in all cases are ascertained by reading the horizontal lines. Then by means of the three vertical columns on the right a ready comparison is provided between the figures given for 1909 and those for 1908, and the average figures for 1904-1908, regarding the increase or decrease of deaths from the chief infantile diseases ; while by means of the lower horizontal column all the figures given for 1909 in the vertical columns and summarised in the upper horizontal column under all causes may be compared with those given as the average for the preceding five years.

Amongst the many interesting features exhibited in this Table, and which would demand much consideration and discussion in the larger report, the relation of feeding to infantile mortality stands out prominently. Of the 210 infants who died, it was found that at the time of death only 31 were breast-fed, while 119 were bottle-fed, and 60 having died chiefly during the first week before any food could be taken. As a fuller illustration of this relationship Table XI. is extracted from the series prepared on the subject of infantile mortality. This Table is calculated from the figures recorded by the Lady Health Visitors on first visits after birth, when it will be seen that 1,052 infants were commenced with breast-feeding. But through numerous causes—personal or domestic, or through the exigencies of circumstances, breast-feeding was soon given up and bottle-feeding substituted.

NUMBER OF BIRTHS AND TYPES OF FEEDING COMMENCED AFTER BIRTH :—

Breast-feeding	1,052
Bottle	954
No Food (died before food could be taken)	60
Unaccounted for (in Workhouse)	3
Total Births Notified...	2,069

TABLE XI.

Mortality per 1,000 Births according to Age and Feeding as commenced and recorded at time of Birth.

Age in Months	— A — Deaths per 1,000 Breast fed infants.	— B — Deaths per 1,000 Bottle fed infants.	RATIO A to B (A. — 10)	
Under 1	11	21	10	19
1—2	5	16	10	32
2—3	3	15	10	50
0—3	19	51	10	27
3—6	5	29	10	58
0—6	24	81	10	34
6—9	3	19	10	63
9—12	3	25	10	83
Under 12	29	125	10	43

COUNTY BOROUGH OF ROCHDALE

Infantile Mortality during Year 1909.—Deaths from stated causes in Weeks and Months under One Year of age.

(Local Government Board Return.)

CAUSE OF DEATH.		Sex.		Legitimate	Illegitimate	Insured	AGE AT DEATH.																																													WARDS.												No. of Deaths Quarter Ending				Total Deaths for the Year 1909.	Year 1908.	Average–5 years 1904-1908
		Male	Female				Under 1 Week			1—2 Weeks			2—3 Weeks			3—4 Weeks			Total under 1 Month				1—2 months			2—3 months			3—4 months			4—5 months			5—6 months			6—7 months			7—8 months			8—9 months			9—10 months			10—11 months			11—12 months																						
							Breast	Bottle	No Food	Breast	Bottle	No Food	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	No Food	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Breast	Bottle	Breast and Bottle	Castleton North	Castleton South	Castleton East	Castleton West	Castleton Moor	Spotland East	Spotland West	Wardleworth East	Wardleworth South	Wardleworth West	Wuerdle		31st March	30th June	30th September	31st December			
ALL CAUSES …	Certified	121	89	194	16	85	60			8			11			12			92				20			17			9			14			10			5			8			8			5			12			10																					
	Uncertified	...	...	...	...	...	...			...			...			...			...				...			...			...			...			...			...			...			...			...			...			...																					
Method of Feeding	Breast	12	19	30	1	13																																																																			
	Bottle	72	47	109	10	72																																																																			
	No Food	37	23	55	5	...																																																																			
	Total	210																																																																							
	(1) Common Infectious Diseases	6	3	6	3	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	1	1	1	...	...	1	...	...	1	...	...	1	...	1	1	1	1	3	...	...	2	4	3	9	31	20·8
	(2) Developmental and Wasting Diseases	68	46	107	7	22	1	...	49	3	1	1	2	7	2	2	7	...	9	15	2	50	1	11	...	...	5	1	1	1	...	...	2	1	...	3	...	...	1	1	...	1	...	...	2	...	...	...	1	...	3	...	...	2	1	4	17	10	10	9	6	10	10	23	8	7	...	32	32	25	25	114	131	114·0
	(3) Diarrhœal and Digestive Diseases	9	5	14	...	11	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	2	...	...	1	2	1	...	...	...	...	1	...	1	...	...	...	...	...	3	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	2	1	1	2	2	2	...	2	1	...	1	6	5	2	14	78	54·0
	(4) Tubercular Diseases	3	...	2	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	1	...	...	...	...	...	...	...	1	1	1	...	3	13	9·6
	(5) Respiratory Diseases	18	21	36	3	31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	...	2	3	...	...	3	1	...	4	...	1	3	...	...	2	1	...	1	...	1	2	...	1	...	...	1	2	1	...	3	3	1	7	4	...	4	3	3	3	7	4	3	...	13	5	7	14	39	69	52·0
	(6) Other Causes	20	11	29	2	12	...	...	10	2	1	...	...	...	...	1	1	...	3	2	...	10	1	1	...	1	...	...	...	...	1	...	3	2	1	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	3	...	...	...	...	2	5	1	4	4	2	2	1	5	3	2	...	6	8	9	8	31	49	40·6
(1) Common Infectious Diseases	Chicken Pox	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·2
	Measles	3	...	1	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	...	1	1	1	3	21	9·6
	German Measles	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·6
	Scarlet Fever	...	1	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	1	...	0·2
	Diphtheria including Mem. Croup	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	...	1·0
	Whooping Cough	2	2	3	1	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...	...	...	1	...	...	1	...	...	...	1	...	1	...	...	...	2	2	4	10	9·6
(2) Developmental and Wasting Diseases	Premature Birth	33	21	50	4	...	...	...	33	1	1	1	2	5	...	1	5	...	4	11	...	34	1	2	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	12	2	2	4	3	6	4	15	4	...	...	16	10	16	12	54	55	49·3
	Congenital Defects (including Atelectasis)	4	8	12	...	3	1	...	6	...	...	...	...	1	...	1	1	...	2	2	...	6	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	3	...	2	1	1	...	1	...	5	3	3	1	12	†5	†8·6
	Injury at Birth	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1·6
	Want of Breast Milk	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	...	0·4
	Atrophy, Debility, Marasmus	20	12	30	2	6	...	...	10	2	...	...	...	1	2	...	...	...	3	1	2	10	...	8	...	...	4	...	...	1	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	3	3	7	1	3	2	3	5	3	2	...	5	12	4	11	32	57	43·0
	Dentition	9	5	13	1	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	2	...	...	...	1	...	1	...	...	2	...	...	...	1	...	2	...	...	2	1	...	2	2	...	1	...	...	2	2	1	4	...	6	5	2	1	14	8	9·2
	Rickets	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·4
	Other Developmental and Wasting Diseases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1·6
(3) Diarrhœal and Digestive Diseases	Diarrhœa (including Epid. and Zym. forms)	4	3	7	...	5	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	1	...	...	1	1	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	2	1	...	...	2	1	...	...	2	5	...	7	66	39·4
	Enteritis, Muco-enteritis, and Gastro Enteritis	3	2	5	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	...	1	...	...	...	...	...	1	2	...	2	5	5	8·9
	Gastritis	1	1	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	2	...	...	2	2	1·6
	Other Diseases of Digestive System	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	4·2
(4) Tuberculous Diseases	Tuberculous Peritonitis, Tabes Mesenterica	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	5	4·2
	Tuberculous Meningitis	2	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	1	1	...	...	2	6	3·4
	Other Tuberculous Diseases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	2·0
(5) Respiratory Diseases	Bronchitis	7	8	13	2	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	1	1	...	...	...	1	...	2	...	1	1	...	...	1	1	...	...	...	...	1	...	1	...	...	...	...	...	...	...	1	...	1	2	...	...	...	1	2	5	2	2	...	3	2	5	5	15	28	22·6
	Pneumonia	3	1	4	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...	1	...	2	...	...	2	4	7	5·4
	Broncho Pneumonia	8	12	19	1	17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	2	...	...	1	...	...	2	...	...	2	...	...	1	...	...	...	...	1	1	...	...	...	...	1	2	1	...	3	2	1	4	1	...	4	3	2	1	2	2	...	...	8	3	2	7	20	33	22·8
	Laryngitis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·6
	Other Diseases of Respiratory System	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	0·6
(6) Other Causes	Syphilis	1	3	4	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	1	1	...	...	...	1	1	1	1	4	6	4·2
	Cerebro Spinal Meningitis	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	0·2
	Meningitis (not Tubercular)	1	1	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	1	...	1	2	5	4·0
	Convulsions	13	5	17	1	5	...	...	8	2	...	...	...	...	...	1	...	...	3	...	...	8	1	...	...	...	...	...	...	...	...	...	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	1	3	...	2	3	2	2	...	3	2	...	...	3	6	4	5	18	26	22·8
	Erysipelas	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·6
	Septic Diseases	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	0·8
	Diseases of Heart and Circulatory System	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	0·8
	Diseases of Nervous System	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	1	1	0·6
	Diseases of Urinary System	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	0·6
	Burns and Scalds	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	1	0·6
	Suffocation and Overlaying	...	1	1	...	..	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	1	1	1·2
	Other Causes	...	2	1	1	...	...	...	1	...	1	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	2	...	2	4	4·2
ALL CAUSES—Totals		121	89	194	16	85	1	...	59	5	2	1	2	7	2	3	8	1	12	17	3	60	5	15	...	3	11	3	3	4	2	...	10	4	2	7	1	...	3	2	2	6	...	1	7	...	1	2	2	2	9	1	...	6	4	8	31	17	16	20	13	18	17	36	18	16	...	53	54	51	52	210	371	291
Average 5 years, 1904-1908		161	130	258	33	137·2	...	...	...	...	...	...	...	...	...	...	...	...	95·0				32·0			27·2			19·8			16·6			15·4			17·4			15·6			14·2			13·0			12·2			12·6			...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		291																																																																								

† Atelectasis excluded—included under Other Developmental Diseases.

The following Table XII. is extracted from the same series in order to show the relation of overcrowding to the infantile death-rate per 1,000 births.

TABLE XII.

Mortality per 1,000 Births according to the number of Persons per Room and Cause of Death.

Cause of Death	Two Persons or under per Room (1,849 Births)		* Over Two Persons per Room (217 Births)	
	Deaths	Infantile Mort'y	Deaths	Infantile Mort'y
Common Infectious Diseases ...	7	4	2	9
Developmental & Wasting Dis...	96	52	18	83
Diarrhœal & Digestive Diseases	11	6	3	14
Tubercular Diseases	3	2	...	...
Respiratory Diseases	33	18	6	28
Other Causes	20	11	11	51
All Causes	170	92	40	184

* Standard of overcrowding as adopted by the Registrar General.

The Feeding Bottle.

Inseparably associated with infant feeding is the feeding bottle. In the early part of 1909, a letter was sent to all the Chemists in this town inviting their co-operation in advising their customers as to the advantages of the tubeless feeding bottle, and in making their exhibition more prominent ; and it is gratifying to be able to record that many Chemists responded heartily and are assisting us considerably in this educative work. Still it seems that like every other bad habit the long-tubed bottle is to die hard ; and one regrets that there are still about 50 per cent. of these still in use, although the Lady Health Visitors are satisfied that their use is diminishing considerably. As emphasised on the card on bottle-feeding now supplied to parents " no one can keep such tubes clean and they are a source of pollution to the milk."

Baby Comforters or Dummy Teats.

The prevalence of this bad habit is notorious. We find from the data collected that fully 74 per cent. of the babies in Rochdale are supposed to be soothed and comforted by a device, which as also emphasised in the card on infant nursing, is a fertile source of introducing infectious dirt into the baby's mouth, and may cause digestive troubles besides creating a bad habit.

Some Considerations on the Causes of Prematurity and Wasting Diseases.

Turning to the causes of death given under six headings and their sub-divisions, it will be seen that although the diseases of childhood are numerous, yet the causes and actual number of diseases from which infants die are few. The causes which take precedence over all others are premature birth, and what are often termed wasting diseases such as atrophy, debility and marasmus. These were respectively the cause of 54 and 32 deaths. If to these we add the deaths caused through congenital defects and dentition, 12 and 14 respectively ; we have in 1909, 112 deaths, or over 50 per cent. of all infant deaths in Rochdale due to developmental and wasting diseases. This statement rather under than over-states the number. For when we consider the large number of infantile deaths registered every year as due to convulsions, and 18 during the past year, the question arises, since Convulsions is not a disease but a symptom-complex, that in many cases the true origin of the disease is traceable to some of the causes already enumerated and of which convulsions is but the symptom.

For England and Wales the average number of deaths per 1,000 births from 1901-1907 due to these causes was 44·5, which compares with a yearly average of 54 for Rochdale during the same period.

For any adequate discussion of this aspect of infantile mortality one must traverse a wide and interesting field of study which cannot be entered upon here. For as no one can run away from ones inheritance ; the ancestral stock, hereditary characters, fitness or unfitness on a basis of health of the parentage,.are all important factors each of which plays its subtle part in moulding the destinies of the offspring.

Then there is the long period of intra-uterine life, when the closest physiological relationship exists between mother and offspring ; and especially during the early or formative part of this period, when the morphology and organogenesis of the new life is developing as well as during the later part of this period, which is the period of most rapid growth of the unborn infant. It is during this period that all influences or conditions, or as they are termed ante-natal influences, which affect the mother are of the gravest importance to the unborn infant. These may be amongst others already enumerated of the nature of matters concerning personal and domestic hygiene ; plentiful supply of appropriate and nutritious food or various degrees of destitution ; toxæmias such as arise from alcoholism, lead and other forms of metallic poisoning, and infections such as syphilis.

Such ante-natal influences acting through the mother, by disturbing the normal physiological relationship which may become pathological, may, and do frequently, so affect her offspring as to determine whether an infant shall be born healthy, diseased or malformed, premature or immature, and such that it may die before or at or soon after birth, or if life is prolonged a little longer, it is so with the finger of death upon it.

Many reasons have been adduced from time to time to explain this wastage of infant life, before life has well begun. These are too numerous to discuss here. We have already adverted to the effect of the ante-natal influences, and any such study must involve a serious consideration of the much debated question of the physical degeneration of the race ; and with special regard to the effect of modern life with all its changeful tendencies and conditions of society, education and industrialism of the girl, the woman, and the mother on whom nature has laid the burden of maternity. For what the mother is the children are.

One purpose, however, I hope has been served in touching on this question, if the above statement is sufficient to convince many; who interest themselves in the problem of the diminution of our high infant mortality, but who sometimes appear to think that the life-history of the infant begins post-natal or after birth, whereas its history is chronicled in its ancestors, and more deeply impressed by the ante-natal influences acting on the mother ; that the problem is not entirely solved by the appointment of Lady Health Visitors who may advise and educate the mother.

Undoubtedly Health Visitors have a great field and are doing very beneficient work, but it has to be recognised that, as in other places in varying degree, so in Rochdale during the past year, ante-natal influences had probably pre-determined the post-natal conditions and life history as regards more than 50 per cent. of the children born, and that for many of these the beneficient work of the Health Visitor could avail little or nothing.

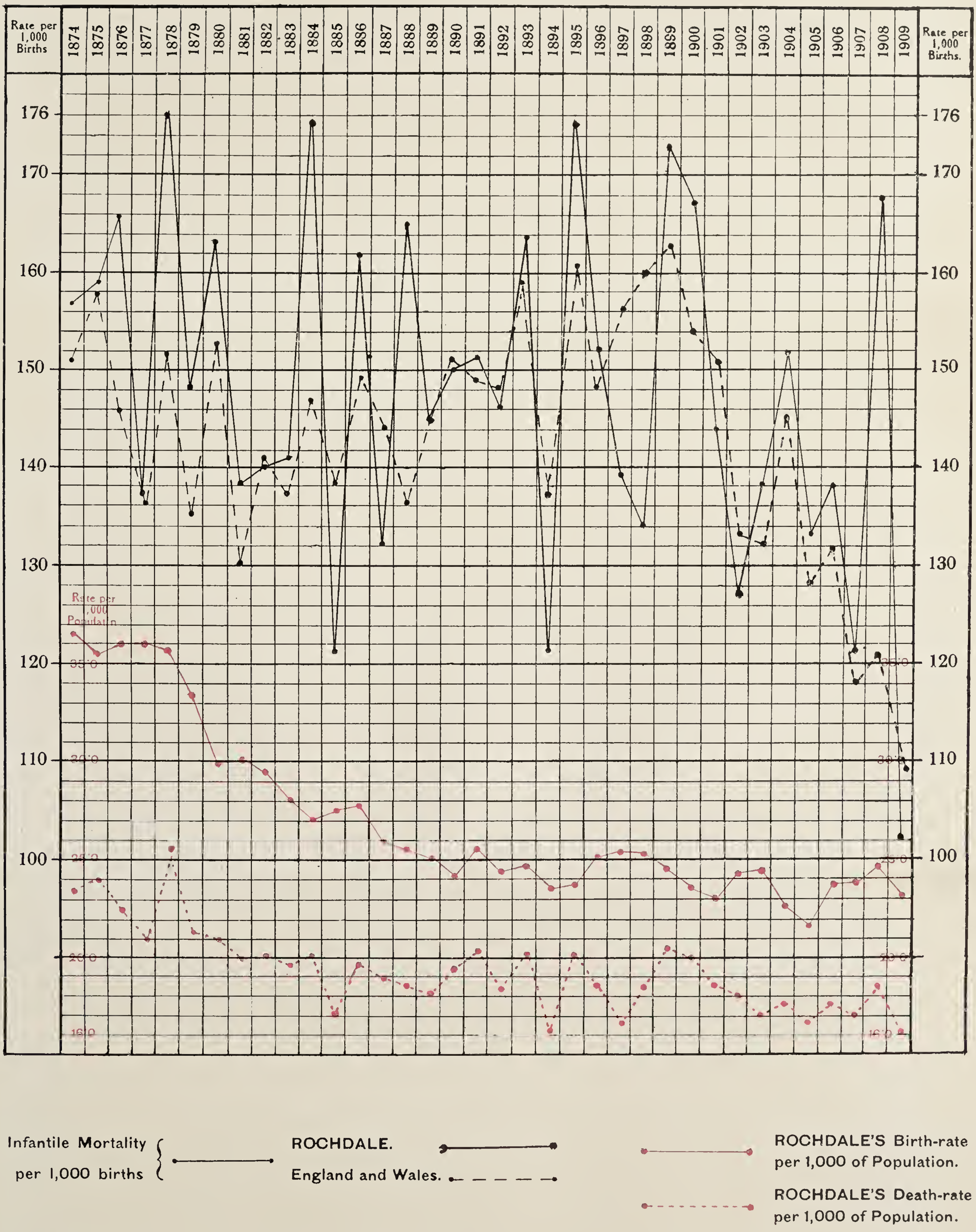
Further, from whatever aspect we contemplate this problem, and the legislation and direction of public affairs bearing thereon, and for which man up to the present has been chiefly responsible, we must conclude that man cannot afford to look on this as entirely a woman's question, " The woman's cause is man's. They rise or sink together. Dwarf'd or godlike, bond or free ; if she be small, slight-natured, miserable, how shall men grow ?"

Some Considerations on the Work during the Year.

It is more than gratifying, however, to be able to record for the past year an infantile death-rate per 1,000 births of 101·7 or 102. This is not only considerably lower than the lowest on record for Rochdale itself, but is seven per 1,000 births lower than the rate for the whole of England and Wales, and 16 per 1,000 births lower than the rate for the 76 Great Towns of England, with which Rochdale is more appropriately comparable (Chart C). In studying the causes of death in Table X. it will be observed that while there is a marked decrease from every cause, and especially from epidemic Diarrhœa, as compared with 1908, and the average for the preceding

CHART C.

Tracings of Birth-rate, Death-rate (all causes), and Infantile Mortality during 1909 and 35 previous years.



five years ; the yearly number of deaths from developmental and wasting diseases remains fairly constant as already discussed.

It is then only reasonable to conclude, although difficult to assess, that so much of this good result is due to the work of the Lady Health Visitors, since much of their work is concerned where no medical man is in attendance ; and no factor has aided the Health Visitors more in their work than the adoption of the Notification of Births Act by this Health Authority, and the loyal and ungrudging manner in which its provisions are respected both by the medical men, midwives, and all others concerned. Since the first few days are often the most critical period in an infant's life, the early notification within 36 hours after its arrival generally ensures the early arrival of the Health Visitor, when such is considered necessary.

During the whole year the chief work of the Health Visitors has consisted in taking care of the infants, where no medical man was in attendance, by advising and instructing or otherwise helping the mother ; and much attention has been given to instructing the mother on the value as also the proper methods of treatment, sterilization and preservation from pollution of the milk for infants, as a very brief investigation soon convinced me that this was a very grave source of infantile disease.

Hence, we have attempted to devise an apparatus by means of which the above objects could be accomplished, and at the same time simple, cheap and efficient ; and I venture to think that Steriliser No. 2 which is now on the market fits this purpose to a remarkable degree. A sketch and instructions how to use it are given in the card on bottle-feeding ; and it might be considered advisable by this Health Authority to get, say 100 to retain in the Health Office and give out on loan to poor people on the recommendation of the Health Visitor, even although the price is only 1/3. For the past year in 87 per cent. of all cases of bottle feeding the milk was sterilised.

Three cards were prepared early in the year on Breast-feeding and Nursing, Bottle-feeding, and Rickets.

These have had a wide circulation and one is often pleased to find them hanging by the fireside in the homes of those for whom they were intended, and being frequently referred to.

As a further and probably more effective method of carrying on this educative work, we may consider it advisable in the near future to institute meetings, or as they are termed schools for mothers, where they may be addressed collectively or by the socratic method of question and answer alternately by teacher and taught.

There is much that concerns this subject to be found in my report on Dairies, Cowsheds and Milk Supplies (See App.)

One cannot close this article without commenting on the excellent work done by the Committee of the Rochdale Crippled Children's Union, and the great claims which such an Institution as well as those of other voluntary workers, have on the support of the community in which they work.

SECTION II.

Infectious Diseases.

The diseases considered here are the seven chief Zymotics—Small-pox, Scarlet Fever, Diphtheria, " Fever " (which includes Enteric, Typhus and simple continued Fever), Measles, Whooping Cough and Diarrhœa ; also Chicken-pox, Erysipelas, Puerperal Fever, Cerebro-spinal Meningitis and Tubercular diseases ; while statistics regarding the incidence, progress and deaths from Influenza and Pneumonia are given in Tables III. and IV.

(*a*) NOTIFIABLE ZYMOTICS.

A statement of the Morbidity and Mortality of Infectious Diseases, during each year from 1892 to 1909 inclusive, is contained in Table I.

Small Pox.

It will be seen that, since the last epidemic year, 1903, in which there were 114 cases, with five deaths, cases of small-pox have gradually disappeared for the present ; and during the past two years there have been no cases within the Borough, although a case was admitted in April, to Marland Hospital, from the Borough of Middleton.

Scarlet Fever.

This is one of the zymotics which tends to observe definite periodic times or cycles of both prevalence and severity. These constitute epidemics, which often extend over a considerable number of years ; and in studying statistics of incidence they will generally be found to recur at intervals of about five years.

Table I. affords some illustration of this theory. It is evident that from 1903 to 1907 an epidemic wave of Scarlet Fever passed over this district, when its crest was reached in 1905 with 478 cases. Tracing backwards we find that the years from 1902 to 1897 inclusive form the trough of the wave, and that from 1896 to 1893 inclusive the wave again assumes epidemic form, with its crest in 1895 and 846 cases. Tracing forwards we are at present in the trough of this wave, and in accordance with this theory we should not anticipate another epidemic wave during the following two or three years.

There were 201 cases reported during 1909. The annual average number of cases during the preceding ten years, 1899-1908, was 253·8, while from 1892 to 1898 it was 373·0.

The epidemiology of Scarlet Fever as with many other zymotics, even with increasing knowledge, is still imperfectly understood. That it is a microbal disease no one can doubt, although at the same time one regrets that the causal micro-organisms of such every day diseases as Scarlet Fever and Measles have not yet been sufficiently differentiated. There is, however, as regards Scarlet Fever, accumulating evidence which points to some organism of the Streptococcus type as the causative agent ; and of these from time to time certain specific types obtained from both human and supposed bovine sources have been described by Klein, Gordon, Kurth and others. But it must be admitted that the subject is an extremely difficult one and beset with many possibilities of error. Streptococci are almost ubiquitous, and exhibit such variations that their differentiation is a matter on which Bacteriologists are not as yet agreed. The streptococcus Conglomeratus—Anginosus—Scarlatinæ has been most frequently described as the specific organism. But in the present state of our knowledge it appears that no definite statement can as yet be made as to the etiological relation of Streptococci to Scarlet Fever. In this disease we find Streptococci of different degrees of virulence almost invariably present in the mouth and throat, and undoubtedly to them many of the complications and sequelæ are due.

Mallory and Duval have recently (1904) described protozoon-like bodies which, in four cases, they discovered in and between the deeper cells of the epidermis. Von Prowazek, however, who has also studied these bodies, doubts their protozoal origin, and it must be said that in the absence of sufficient scientific evidence their etiological significance is very doubtful. Still, should such organisms prove to be specific, it would have considerable influence on the unsettled

TABLE I.

Morbidity and Mortality of Infectious Diseases during each year from 1892 to 1909 inclusive.

DISEASE		YEARS																	ANNUAL AVERAGES		
		1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	7 YEARS 1892–1898	10 YEARS 1899–1908	1909
Compulsorily Notifiable—																					
SMALL-POX	No. of Sicknesses	2	32	14	7	2	...	...	...	2	1	24	114	3	2	4	1	...	8·1	15·1	...
	No. of Deaths	...	5	1	...	...	...	...	...	...	...	...	5	1	...	...	...	...	0·1	0·6	...
	Per cent. of Deaths to Sickness	...	15·6	7·1	...	...	...	...	...	...	...	...	4·4	33·3	...	...	...	...	3·2	3·8	...
SCARLET FEVER	No. of Sicknesses	124	292	797	846	371	97	84	211	114	195	91	304	413	478	335	245	152	373·0	253·8	201
	No. of Deaths	2	11	29	45	24	7	3	9	2	7	2	11	14	22	13	4	7	17·3	9·1	10
	Per cent. of Deaths to Sickness	1·6	3·8	3·6	5·3	6·5	7·2	3·6	4·3	1·8	3·6	2·2	3·6	3·4	4·6	3·9	1·6	4·6	4·5	3·4	5·0
DIPHTHERIA (incl. Mem. Croup)	No. of Sicknesses	21	44	80	89	40	16	27	29	32	44	36	69	55	54	81	104	82	45·3	58·6	84
	No. of Deaths	5	17	48	27	9	7	4	13	7	16	9	21	18	26	20	22	19	16·7	17·1	13
	Per cent. of Deaths to Sickness	23·8	38·6	60·0	30·3	22·5	43·7	14·8	44·8	21·9	36·4	25·0	30·4	32·7	48·1	24·7	21·2	23·1	33·4	30·8	15·5
TYPHOID FEVER (incl. Contd. Fever)	No. of Sicknesses	27	70	68	42	55	29	77	35	30	51	37	31	22	34	23	16	23	52·6	30·2	18
	No. of Deaths	6	19	9	9	7	6	16	9	3	8	4	7	7	3	5	5	9	10·3	6·0	3
	Per cent. of Deaths to Sickness	22·2	27·1	13·2	21·4	12·7	20·7	20·8	25·7	10·0	15·7	10·8	22·6	31·8	8·8	21·7	31·3	39·0	19·7	21·7	16·7
TYPHUS FEVER	No. of Sicknesses	...	...	...	1	...	...	6	...	...	...	...	...	...	...	...	...	...	1·0	...	...
	No. of Deaths	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	0·1	...	...
	Per cent. of Deaths to Sickness	...	...	...	100.	...	...	...	...	...	...	...	...	...	...	...	...	...	14·3	...	...
PUERPERAL FEVER	No. of Sicknesses	7	19	11	11	7	7	17	9	9	13	10	7	11	8	13	10	5	11·3	9·5	4
	No. of Deaths	3	12	6	5	4	4	7	3	3	6	3	3	2	5	5	6	1	5·9	3·7	1
	Per cent. of Deaths to Sickness	42·9	63·2	54·5	45·5	57·1	57·1	41·2	33·3	33·3	46·2	30·0	42·8	18·2	62·5	38·5	60·0	20·0	51·6	38·5	25·0
ERYSIPELAS	No. of Sicknesses	57	56	69	54	72	43	103	84	42	81	61	69	60	81	73	50	55	64·9	65·6	60
	No. of Deaths	1	3	1	5	4	...	2	2	2	5	...	3	1	2	6	...	1	2·3	2·2	2
	Per cent. of Deaths to Sickness	1·8	5·4	1·4	9.3	5·6	...	1·9	2·4	4·8	6·2	...	4·4	1·7	2·5	8·2	...	1·8	3·6	3·2	3·3
***Not Compulsorily Notifiable—**																					
MEASLES	No. of Sicknesses	2	...	...	...	...	...	...	345	577	46	478	72	459	72	224	60	80	0·3	241·3	101
	No. of Deaths	3	76	4	35	43	68	13	24	34	5	71	4	42	1	50	24	66	34·6	32·1	17
WHOOPING COUGH	No. of Sicknesses	30	...	...	...	...	...	...	179	163	67	67	174	74	...	...	...	...	4.3	72·4	98
	No. of Deaths	24	49	10	19	52	18	2	19	34	20	13	42	36	13	19	27	25	24.9	24·8	6
CHICKEN POX	No. of Sicknesses	...	...	...	...	...	...	...	...	...	...	...	110	178	30	83	169	12	...	58·2	125
	No. of Deaths	...	...	...	2	...	...	...	...	...	...	1	...	...	2	...	...	...	0·3	0·3	...

* As these diseases are not compulsorily notifiable the numbers here recorded are probably incomplete.

question of the infectivity of desquamating skin, which by many at the present moment is considered not to be infectious in its later stages.

But besides the variability and degree of pathogenicity of the attacking micro-organisms and their means of propogation and dissemination, there is always the factor of little less importance, the accumulation or diminution of susceptible persons with their varying powers of resistance, and in so far as these conditions are aided or retarded by good or bad sanitary and climatic conditions. Other factors are undoubtedly frequently in operation, but whose correlation with the epidemiology of this as with many other zymotics is only as yet dimly apprehended.

Diphtheria.

This disease does not exhibit the same tendency to periodicity or cyclical waves as observed in Scarlet Fever ; and when traced out over a long record of statistics the epidemic wave is usually found to extend over a greater number of years, followed by a corresponding longer interval of comparative quiescence.

By referring to Table I., however, the statistics for the years under review exhibit two slight epidemic waves of Scarlet Fever already described.

During the year 1909, 84 cases were notified or discovered ; and, with the exception of 1907, when there were 104 cases, this is the next largest number of cases reported during the past 18 years. This compares with an annual average of 58·6 during the decade 1898 to 1908, and with 45·3 cases during the septennium 1892 to 1898. Throughout England it has to be noted that in recent years Diphtheria has shown a tendency to increased prevalence.

Typhoid Fever.

Unlike Scarlet Fever and Diphtheria this zymotic in its incidence exhibits no cyclic tendency, and depends more on conditions of sanitation in so far as these protect the people from exposure to infection. Consequently the incidence and spread of this disease should be more under the control of every Sanitary Authority ; and it is very gratifying to observe that during the past 18 years the number of cases has been slowly declining. During 1909 there were 18 cases, and this compares with an annual average of 30·2 during 1898 to 1908, and with 52·6 from 1892 to 1898.

Typhus Fever (formerly known as Jail Fever).

This disease, although very different in its etiology and epidemiology, was only clearly distinguished from Typhoid Fever in this country by Jenner in 1850. Frequently in past centuries, and in epidemic fashion, it swept over Europe, England, Ireland and Scotland. It was the common pestilence of history, which accompanied and followed in the wake of famines and wars, and was invariably associated with overcrowding, debility, filth, and bad sanitation, and its gradual disappearance is one of the great benefactions to humanity of the application of preventive medicine.

Erysipelas.

As seen from Table I. the incidence of this disease has varied little during the 18 years under review. There were 60 cases and two deaths during 1909, and this compares with 66 cases and two deaths during the preceding decennium. In this country Erysipelas generally appears in sporadic form, although it appears that some are more predisposed than others, and chiefly the intemperate and debilitated and those who have already had it. In earlier times it was frequently an institutional disease, appearing with great virulence and persistent recurrence in the Surgical Wards of Hospitals where overcrowding and defective sanitation existed. This disease also exhibits a slight seasonal incidence and higher death-rate extending usually from September to March, and in this respect resembles Scarlet Fever, Diphtheria, Rheumatic Fever and Puerperal Fever. The etiological connection between Erysipelas and Puerperal Fever is still ill-understood, although from clinical experience there is strong evidence that a relationship does exist. It is well known how susceptible are women in labour to Puerperal Fever, if attended, by Medical Men, Midwives or Nurses, who either themselves have been suffering from Erysipelas or been recently in contact with erysipelatous patients ; and on the other hand, how the latter, while in attendance on puerperal cases frequently suffer from Erysipelas. It is also noted that the infants of mothers suffering from Puerperal Fever frequently die from Erysipelas. The explanation will probably be found in an extended study of the biological and pathogenic characters of the most probable causal micro-organisms—the streptococci. In puerperal septicæmia they are nearly always present in large numbers, but in Erysipelas the streptococcus present is considered by many so specially differentiated as to receive a distinctive name, but of this there is considerable doubt. Certainly in their modes of action and pathogenic properties they exhibit marked differences which are at present not clearly understood.

Puerperal Fever.

It is very gratifying to find the gradual decline in the number of cases of Puerperal Fever during the past 18 years, and it reflects favourably on medical practice in this town. During 1909 there were four cases and one death, while during 1892-1898 there were a yearly average of 11·3 cases and 5·9 deaths ; and during 1899-1908, 9·5 cases with 3·7 deaths.

Case Mortality or Percentage of Deaths to Sickness.

In reviewing Table I., when these case mortality rates during the past decennium from 1899 to 1908, and the preceding septennium from 1892 to 1898 are compared, no marked decline is observable in the compulsory notifiable diseases nor in the number of deaths from non-compulsory notifiable diseases. When these rates, however, are compared with those for 1909, there is a considerable decline in every case except Scarlet Fever, which is slightly higher, and Erysipelas, which remains stationary.

The non-notifiable diseases are discussed later.

TABLE II.

Return relating to Vaccination of Infants during 9 years 1900-1908, for Rochdale Registration District.

YEAR	No. of Births Registered	Died before Vaccination	No. Surviving	Successfully Vaccinated		Insusceptible to Vaccination		NOT VACCINATED Statutory Declaration of Conscientious Objection		REMAINDER OF SURVIVING CHILDREN					
										Postponed by Medical Certificate		Removed to other Districts		Not otherwise accounted for	
				Number	Per-centage	Number	Per-centage	Number	Per-centage	Number	Per-centage	Number	Per-centage	Number	Per-centage
1900	2900	328	2572	1503	58·4	6	0.2	425	16·5	12	0·5	169	6·6	457	17·8
1901	2697	312	2385	1567	65·7	1	...	391	16·4	31	1·3	185	7·8	210	8·8
1902	2838	277	2561	2051	80·1	3	0·1	323	12·6	36	1·4	122	4·8	26	1·0
1903	2869	303	2566	2006	78·2	1	...	428	16·7	38	1·5	86	3·3	7	0·3
1904	2738	267	2471	1959	79·3	4	0·2	399	16·1	29	1·2	77	3·1	3	0·1
1905	2634	265	2369	1811	76·4	2	0·1	436	18·4	47	2·0	68	2·9	5	0·2
1906	2787	286	2501	1846	73·8	2	0·1	561	22·4	34	1·4	52	2·1	6	0·2
1907	2778	252	2526	1674	66·3	2	0·1	708	28·0	40	1·6	88	3·5	14	0·6
1908	2957	290	2667	1252	46·9	6	0·2	1280	48·0	39	1·5	73	2·7	17	0·6

Small-Pox and Vaccination.

The accompanying Table II. has been compiled from figures which have been supplied through the kindness of Mr. Leach, Registrar and Clerk to the Board of Guardians. This Table relates to the vaccination of infants in the whole of the Rochdale Registration District, which includes a population of approximately 127,940 ; and gives the statistics during nine years—1900 to 1908. The facts stand out clearly in parallel columns under appropriate headings. In passing one cannot but note that there is only an increase of 57 births registered from 1900 to 1908 ; that there were 38 fewer deaths, and consequently 2,667, or 95 more surviving infants for vaccination than in 1900. Of these 1,252, or 46·9 per cent. were successfully vaccinated, while it was found that six, or two per cent. were insusceptible of vaccination. We now come to the most interesting column, and which provides some material for grave reflection. From 1900 to 1906, the number not vaccinated through statutory declaration of conscientious objection varied from 425 to 561. In the following year the number rose to 708 ; then, on the 1st January, 1908, the Act which permits persons to make a statutory declaration of conscientious objection before a magistrate, came into operation, and the number in this same year now rises to 1,280, or 48 per cent. of the infants born and registered in this district are unvaccinated; of the remaining 129 infants, the vaccination of 39 was postponed by medical certificate, 73 were removed to other districts, and 17 remained unaccounted for.

The two dominant and impressive facts which this table exhibits are :—the enormous and increasing number of unvaccinated children in this district ; (2) the immediate effect of the coming into operation on the 1st January, 1908, of the 1907 Vaccination Act, which allows a statutory declaration of conscientious objection to be made by the parent to the vaccination officer. The psychological phase of mind of the conscientious objector is readily understood. In the natural history of the evolution of the human mind there have been in the past, just as there will be in the future, many variations in type of mind and intellect. Accordingly there are those who either see not, and think not, as others, or through the want of clear thinking may conscientiously differ ; but it is well to recognise that there are also those who abandon reason and differ from others either through a species of obtuse mindedness, or even for the glory of differing, or both. With the former type of mind one can entertain a reasonable sympathy, but with the latter none. To both types of mind, however, one regrets too frequently to find that both the knowledge and experience of the world as well as the wisdom of the age is of no avail.

From the philosophical standpoint, this freedom of thought and action is quite tolerable and can be appreciated. But from the standpoint of Public Health every individual is not and never can be entirely responsible to himself, he cannot sever his individual from his public responsibility, and more especially is this true in urban life, where human beings are densely aggregated together.

The public memory is short. The terrors of Small-pox in pre-vaccination and later days is for the present almost forgotten, although the people were mowed down in thousands by epidemic waves, which at intervals swept across the land ; and to escape death they often willingly submitted to a form of inoculation as a preventive, which in itself caused a death-rate of two to three per cent. ; and when so wide was the impress of the disease in this country that the English people were described by earlier historians as a pock-pitted race. Likewise is forgotten the last great pandemic wave which during 1871-72 swept across Europe and America, causing something like 400,000 deaths, and 10 per cent. of the deaths in London.

That vaccination is the only safe and effective preventive against Small-pox has now been demonstrated by a wealth of scientific evidence and experience, which is incontrovertible ; and I venture to state that those who still question the truth of this evidence are in my opinion incapable of the understanding of truth.

When the anti-vaccinator states that vaccination neither prevents nor modifies Small-pox, there is no argument ; but when he states that vaccination is no good because so many people who have been vaccinated in the end take Small-pox, then this statement deserves consideration.

One Vaccination confers limited immunity.

All great men have made mistakes, otherwise they could not have been great ; and we readily admit that Jenner, the discoverer of vaccination, and thereby one of the greatest benefactors to humanity, made one considerable mistake in his life's work when he said that the protection of vaccination would be as powerful and as lasting as the protection of a previous attack of Small-pox. We now know vaccination does not afford the same protection, neither does it last as long as that conferred by an attack of Small-pox. The protective influence of the primary vaccination fades at a different rate in different individuals ; and consequently, although every child once efficiently vaccinated retains a diminished susceptibility for the remainder of its life, and even if attacked in later life the disease appears in a mild form, yet there are few persons insusceptible to re-vaccination after 12 years. Hence, to give complete protection, vaccination must be repeated.

In Germany so complete is vaccination carried out, and all children re-vaccinated in their 12th year, that Small-pox is now almost extirpated.

In support of this contention Sheffield is frequently adverted to by the anti-vaccinator as a well-vaccinated town, yet during the epidemic in 1887-88, many who had been vaccinated took Small-pox. This is so far true, but what are the facts ? Population of Sheffield, 274,112, of whom 268,397 had been once vaccinated, leaving 5,715 unvaccinated, and there were 6,088 cases.

Among the un-vaccinated the mortality was 48 per 1,000
,, vaccinated ,, ,, 0·7 ,,
Children under 10 unvaccinated the mortality was 44·3 per 1,000
,, ,, vaccinated ,, ,, 0·9 ,,

Among 56,233 persons re-vaccinated during 1887-88 only two had a slight attack of a doubtful nature, and none died. Of 8,198 persons re-vaccinated just prior to the outbreak of the epidemic 25 were attacked and one died.

Importance of Proper Vaccination.

In pre-vaccination times the heaviest incidence fell on childhood, and it is so still in unvaccinated communities.

Now among vaccinated communities childhood is exempt and the immunity conferred by vaccination may be extended indefinitely by re-vaccination so as to give protection for life against Small-pox.

In a mixed community—vaccinated and unvaccinated—both these effects are very evident, and when visited by an epidemic the heaviest attack incidence and case mortality falls on the unvaccinated, while among the vaccinated who suffer, those nearest to the date of their vaccination suffer the least, which is usually inversely to age, and the case mortality is extremely slight and diminishes in proportion as the number or area of the cicatrices increase.

The truth and importance of this last point is clearly seen in the returns of all hospitals where such are kept, and it is a matter which demands the serious consideration of every vaccination officer. Every child should be vaccinated in at least four places, and the total area of the cicatrices should not be less than half a square inch.

Vaccination a medium of transmission of Disease.

Again it is stated that vaccination may give rise to other diseases, and we willingly examine this argument. When vaccination was practised from arm to arm there may have arisen at times the suspicion of the virus of any other disease, especially syphilis being inoculated with the lymph from an apparently diseased or unhealthy child. But in this respect much that has been spoken and written has been by prejudiced persons. For when such cases have been inquired into it was usually found that grave errors had been committed in the performance of the operation of vaccination, or that due precaution had not been taken in the selection of the source of vaccine lymph or in protecting the vaccination wounds.

Any room for suspicion even on this ground has been removed by the introduction of glycerinated calf lymph, prepared in Government Laboratories, which is free from the germs of any other disease, and now takes the place of the arm to arm vaccination.

In considering the enormous number of vaccinations that have been performed during the past 50 years, even any doubtful cases of disease arising therefrom are so few as to be almost negligible.

Isolation a better preventive than Vaccination.

Another argument occasionally put forward is that isolation is a better preventive than vaccination. This is frequently stated without any evidence, and consequently merits no further discussion as all known evidence tends to prove the converse.

As an attempted proof of this, the experience of Leicester is put forward, where isolation of Small-pox has been strictly practised. But as the bulk of the inhabitants of Leicester have been vaccinated, isolation is not substituted for vaccination ; and the experience of Leicester is really an experiment as to the efficiency of isolation plus vaccination more or less complete. There seems here often a confusion of thought. Isolation assumes that the isolated patient can be surrounded by a cordon of people, such as nurses, attendants, etc., who are themselves protected by vaccination ; otherwise there could be no isolation unless in some vast wilderness. Conversely, if vaccination were given up there could be no such cordon and consequently no justification for attempting isolation. Presently the unvaccinated has the benefit of the protection of the vaccinated.

The real test of isolation as a preventive would be during any epidemic to isolate the unvaccinated together, and let them tend each other ; while the vaccinated or protected persons give them a wide berth.

I have touched on these epidemics of Small-pox at Leicester and Sheffield, because by the former it has been attempted to prove the efficiency of isolation versus vaccination, and by the latter to prove that vaccination is useless as a preventive. When these and all similar contentions of the anti-vaccinator are critically examined, they not only fail to prove the point, but rather tend to prove the converse.

Vaccination in Germany.

In Germany so completely is vaccination carried out that there is little need for isolation, and cases of Small-pox are rare and can be nursed with safety in the pavilions of general hospitals.

Defects in methods of Registration.

The condition of things regarding the remaining surviving and unvaccinated children as shown in this Table must be considered highly unsatisfactory ; unfortunately, as the vaccination registers of children born in any one year are closed at the end of the following year, the returns of the Registrar General are consequently incomplete as regards the subsequent history of those whose vaccination has been postponed or on account of their being no longer traceable.

In 1908 there were 129 of such children in this Registration District, and undoubtedly some of these have been or will be vaccinated at some later period ; but at present no provision exists for their being recorded in the returns of the Registrar General, but I venture to think that it is desirable for many reasons that such provision should be made.

Effect of 1907 Act and the lesson of Gloucester.

Turning for the moment to the immediate effect of the coming into operation of the 1907 Act, it is evident that if the proportion of unvaccinated children continue to increase in the same ratio as in 1908, as we have now every reason from present experience to believe they will, we will soon arrive at a condition of things when the great majority of the young population will be unvaccinated and unprotected against Small-pox at just the most susceptible period of life ; for in pre-vaccination times 90 per cent. of the deaths were under five years of age. Then, at some evil hour, it only needs the introduction of the virus when just as certain as history repeats itself, it may be in this and many other towns of England, the tragedy of the 10,000 unvaccinated children of Gloucester will be reacted, when in the epidemic of 1895 to 1896, 688 were attacked and 279 died, while many remained disfigured and blind for life.

I am not aware of any anti-vaccinator who in the presence of an early death from Diphtheria refuses to have his child treated with anti-diphtheritic serum. Hence it is difficult to comprehend the mind of the man who refuses to take means to protect his child from the possibility of even a more certain and hideous form of death at some future day.

With many such people, however, at the critical hour, their former vaunted beliefs in the uselessness of vaccination are found to be waning just as the epidemic wave is rising ; and then they may be found rushing hither and thither to trim their lamps when often too late.

From the records of the Gloucester Board of Guardians we find that before the epidemic was half abated nearly 8,000 of the 10,000 had been vaccinated, and at the end of it, not more than 250 of the 10,000 remained unvaccinated. By referring to the Table it will be seen that vaccination for the period under review was most complete in Rochdale from 1902-1903, when the town was threatened with a slight outbreak of Small-pox.

The Legislature and Legislation.

We have tried to understand and to reason with or otherwise to account for the phase of mind of the anti-vaccinator. We can also understand and appreciate all legislation which led up to compulsory vaccination with certain reasonable modifications in certain cases ; but it appears to me that some of the recent Vaccination Acts, which provide loopholes and means of evasion of the very principles of preventive medicine, for the administration of which in recent years a Government Department and network of administrative departments and officers have been created, can only be understood by a process of reasoning, which sets up one law and another to evade it, and which is conceivable to the parliamentary mind.

TABLE III.

Cases of Infectious Disease notified or discovered during Year 1909, and distributed according to Wards of the Borough, also Cases removed to Hospital from each Ward.

DISEASE		AGE OF PATIENTS						WARDS OF BOROUGH.											TOTAL CASES
		Under 1 year	1—5 years	5—15 years	15—25 years	25—65 years	65 years and over	Castleton North	Castleton South	Castleton East	Castleton West	Castleton Moor	Spotland East	Spotland West	Wardleworth East	Wardleworth South	Wardleworth West	Wuerdle	
A.—Compulsorily Notifiable—																			
Small-pox	Cases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Scarlet Fever	Cases	1	55	129	12	4	...	10	31	25	37	30	11	16	5	14	11	11	201
	Deaths	1	6	3	...	...	...	1	1	1	2	1	1	1	...	...	1	1	10
	Removed	1	44	79	8	3	...	8	20	17	20	22	9	9	5	8	10	7	135
Diphtheria	Cases	5	18	46	8	7	...	5	17	15	17	5	6	3	3	7	3	3	84
	Deaths	1	7	4	1	...	...	...	2	...	6	...	...	1	1	1	2	...	13
	Removed	4	9	18	6	4	...	3	5	8	14	1	2	...	...	5	2	1	41
* Typhoid Fever	Cases	...	...	1	4	12	1	1	5	...	...	4	...	1	3	2	1	1	18
	Deaths	...	...	...	1	1	1	...	...	...	...	...	...	...	2	...	1	...	3
	Removed	...	...	1	1	9	...	...	4	...	...	3	...	...	1	2	...	1	11
Typhus Fever	Cases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Erysipelas	Cases	...	1	4	6	41	8	1	7	7	5	9	5	2	4	5	11	4	60
	Deaths	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	2	...	2
Puerperal Fever	Cases	...	...	...	1	3	...	...	...	...	2	1	...	...	1	...	...	...	4
	Deaths	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	1
B.—Not Compulsorily Notifiable—																			
Measles	Cases	...	...	...	...	...	...	5	3	4	3	2	18	16	4	6	19	21	101
	Deaths	3	12	2	...	...	...	...	...	1	...	...	2	...	3	4	3	4	17
Whooping Cough	Cases	...	...	...	...	...	...	...	6	5	16	36	2	...	4	12	3	14	98
	Deaths	4	2	...	...	...	...	...	1	...	1	1	...	...	...	1	...	2	6
Chicken-pox	Cases	...	...	...	...	...	...	21	17	7	5	9	17	39	1	9	...	...	125
	Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cerebro-Spinal Meningitis	Cases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Deaths	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1
TOTALS	†Cases	6	74	180	31	67	9	43	86	63	85	96	59	77	25	55	48	54	691
	Deaths	9	27	9	3	3	1	1	4	2	9	3	3	2	6	6	9	7	52
	Removed	5	53	98	15	16	...	11	29	25	34	26	11	9	6	15	12	9	187
Tuberculous Disease—																			
Phthisis (a) Vol. Notification	Cases	...	...	...	4	6	1	...	...	...	...	4	...	1	2	1	1	2	11
Phthisis (b) Comp. Notification	Cases	...	1	3	5	83	4	15	6	7	3	1	9	8	11	20	13	3	96
TOTALS	Cases	...	1	3	9	89	5	15	6	7	3	5	9	9	13	21	14	5	107
	Deaths	...	2	4	11	72	8	9	12	9	9	6	8	4	9	14	10	7	97
(c) Other Tuberculous Dis.	Deaths	3	13	3	3	5	...	2	4	4	2	2	4	1	5	1	1	1	27
Influenza	Deaths	...	...	3	1	13	18	2	8	4	3	1	4	2	1	4	6	...	35
Pneumonia	Deaths	25	23	7	4	45	14	8	10	9	13	14	8	13	12	13	6	12	118

* Including Para-Typhoid Fever.

† The Total Cases in Age Columns only refers to those compulsory notifiable.

TABLE IV.

Progress of Infectious Disease during the Year 1909, being Cases notified and discovered in each Month.

DISEASE		1909												
		January	February	March	April	May	June	July	August	September	October	November	December	Total for the Year.
A.—Compulsorily Notifiable—														
Small Pox	Cases	...	...	...	...	...	...	...	...	...	...	...	...	...
	Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...
Scarlet Fever ...	Cases	5	14	13	18	8	16	7	8	21	29	30	32	201
	Deaths	...	...	...	1	...	1	...	1	...	1	4	2	10
Diphtheria	Cases	19	7	6	10	4	4	11	4	9	5	1	4	84
	Deaths	*5	...	...	...	...	1	3	...	3	...	...	1	13
†Typhoid Fever	Cases	...	1	3	2	3	1	...	1	...	3	3	1	18
	Deaths	...	1	...	...	...	...	...	...	1	...	1	...	3
Typhus Fever ...	Cases	...	...	...	...	...	...	...	...	...	...	...	...	...
	Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...
Erysipelas.........	Cases	4	4	10	4	7	2	...	2	3	12	6	6	60
	Deaths	...	...	...	1	...	...	...	...	1	...	...	...	2
Puerperal Fever	Cases	...	...	1	...	2	...	...	...	...	...	1	...	4
	Deaths	...	...	1	...	...	...	...	...	...	...	...	...	1
B.—Not Compulsorily Notifiable—														
Measles	Cases	...	...	...	18	13	5	16	4	7	6	19	13	101
	Deaths	1	3	6	2	2	...	1	...	1	...	...	1	17
Whooping Cough	Cases	...	...	...	5	19	9	6	1	2	9	16	31	98
	Deaths	...	...	...	...	...	1	...	...	2	1	...	2	6
Chicken Pox ...	Cases	...	...	...	4	34	13	18	3	5	29	6	13	125
	Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...
Cerebro-Spinal Meningitis...	Cases	...	...	...	...	...	...	...	...	...	...	...	...	...
	Deaths	...	...	...	...	...	...	...	...	...	...	...	1	1
Total	Cases	28	26	33	61	90	50	58	23	47	93	82	100	691
	Deaths	6	4	7	4	2	3	4	1	8	2	5	7	52
Tuberculous Diseases—														
Phthisis (*a*) Vol. Notification	Cases	2	...	2	...	2	1	...	...	2	2	...	...	11
Phthisis (*b*) Comp. Notification	Cases	43	6	9	2	1	5	5	1	3	4	7	10	96
Total	Cases	45	6	11	2	3	6	5	1	5	6	7	10	107
	Deaths	12	5	11	7	9	9	4	9	11	8	4	8	97
(*c*) Other Tubercular Diseases	Deaths	5	2	1	2	3	3	2	...	2	2	2	3	27
Influenza	Deaths	3	7	8	6	2	5	...	...	...	2	...	2	35
Pneumonia	Deaths	13	13	17	7	9	15	4	3	7	6	14	10	118

* One of these deaths occurred suddenly and the case was not notified as Diphtheria.

† Including Para-Typhoid Fever.

Scarlet Fever.

According to Table I. there was a total of 201 cases of Scarlet Fever within the Borongh during the past year, about 50 more than in 1908, and about 50 less than in 1907.

Their distribution in months is seen in Table IV. During the first eight months there were only 110 cases notified, while during the last three months there were 91 cases.

Regarding the distribution in wards the chief incidence has chiefly fallen on the Castleton area. In this area alone there were 133 cases, leaving 68 amongst the rest of the wards.

Of the 201 cases notified, 150 were in attendance at school, and the schools most affected were in the Castleton area, where cases began to appear after the re-opening in September. In Brimrod, Trinity and Heybrook schools there were 50 cases, or one-third of the cases were associated with these three schools. In Brimrod there were 24 cases.

Although we now recognise that the spread of this disease is chiefly through contact infection, for which schools afford every facility, yet, after a very careful enquiry, and having due regard to the incidence and distribution of the cases in time and place we came to the conclusion that infection did not take place in these schools to any appreciable extent, neither in the infant nor mixed departments ; and that the same may be stated for the other schools affected.

On the other hand, in tracing the most probable paths of infection, since many of these cases were nursed at home, one cannot but be impressed with the difficulty in many cases in maintaining a condition of satisfactory isolation, in small two or three-roomed houses, and consequently there appeared to be a connecting chain of infection between a few small areas where several cases occurred.

Again every epidemic or increased prevalence is nearly always associated with diminished average severity towards its close, and consequently we have the missed or undiagnosed cases, some of which were detected during the year on school medical inspection. Such cases are a very frequent source of infection.

Then again there are " carrier cases," or persons though not themselves clinically ill, may yet transmit the disease to others.

The milk supply in no case appeared to be implicated.

TABLE V.

DIPHTHERIA, 1909.—Sanitary Conditions of Houses where the disease occurred.

WARD	No. of Cases	No. of Houses affected	Type of House		Type of Closet				Condition of External Surfaces						Condition of Drainage	
									Yard			Passage				
			Through	Back-to-Back	Pail	Privy Midden	Fresh Water Closet	Waste Water Closet	Paved	Unpaved	No Yard	Paved	Unpaved	No Passage	Good	Defective
Castleton North...	5	4	3	1	4	...	...	...	3	...	1	1	2	1	4	...
Castleton South ..	17	14	14	...	11	...	2	2	13	...	1	6	6	2	12	2
Castleton East ...	15	14	11	3	11	...	2	1	10	2	2	4	8	2	13	1
Castleton West ...	17	10	8	2	8	...	4	1	9	...	1	5	3	2	5	5
Castleton Moor ...	5	5	5	...	2	1	2	1	3	2	...	1	4	...	5	...
Spotland East	6	6	3	3	6	...	1	...	5	...	1	1	1	4	2	4
Spotland West ...	3	3	3	...	2	...	1	1	2	1	...	1	2	...	3	...
Wardleworth East	3	3	3	...	1	...	...	2	3	...	...	3	...	...	3	...
Wardlew'th South	7	7	6	1	6	...	...	1	6	1	...	3	3	1	5	2
Wardlew'th West	3	3	2	1	1	...	1	1	3	...	...	2	1	...	2	1
Wuerdle	3	3	2	1	3	...	...	...	2	1	...	...	3	...	3	...
The Borough	84	72	60	12	55	1	13	10	59	7	6	27	33	12	57	15
Percentages	...	...	83·3	16·7	...	...	...	...	...	...	...	...	...	...	79·2	20·8

Diphtheria.

Tables I., III., and IV., show that there were 84 cases of this disease during 1909, with 13 deaths ; and this compares with 82 cases in the previous year, with 19 deaths. Although every ward has contributed its quota of cases, yet again the chief incidence of this disease has fallen on the Castleton area, in which there were 59 out of the 84 cases. Still the most of these outbreaks appeared to be chiefly of a sporadic form with no epidemic significance. The distribution in time has been fairly even throughout the year except in November, when there was only one case notified, and in January, when there were 19 cases notified, some of which were of a distinctly more severe type than those during the rest of the year.

In one family there were five cases, two of which died. The first very suddenly, and formed the subject of an inquest, and the other immediately on admission to Hospital. These cases occurred in Meadow Place, in a back-to-back house, with defective drainage and sanitary conditions. This same house some years ago was the focus of an outbreak of Enteric Fever with 10 cases, four of which and one death occurred in this house.

Every case when notified was carefully investigated and any source traced and all necessary precautions taken. Of the 84 cases, 42 were of school age and attending school. Out of the 31 Borough schools 18 schools were affected, but the most of these had only from one to four cases, and only one school had seven cases.

The milk supply did not appear to be responsible for the spread of infection.

Then, while we cannot consider Diphtheria to any appreciable extent an air-borne, nor a water-borne disease, there is strong evidence that all insanitary conditions, such as dampness of houses, filth and effluvia of all kinds are strong predisposing causes ; and further, that the cases which occur under such conditions are often more severe and have a higher case mortality. These conditions have so frequently been associated with Diphtheria in its worst epidemic forms, and have been recently strongly adverted to in a report by one of the Inspectors of the Local Government Board, while investigating a Diphtheria epidemic in the Enfield Urban District. At the same time it is readily admitted that if no actual infection occurs, houses, and even districts of the worst insanitary type, may remain free from Diphtheria for indefinite periods ; while owing to the frequent sporadic nature of outbreaks and the impossibility of at times preventing the introduction of infection, Diphtheria will occur readily enough in houses and districts in which no insanitary defects can be found.

In Table V. are summarised the sanitary conditions of houses where the cases occurred. 72 houses were affected and 84 cases.

In 4 houses there were 2 cases in each
,, 2 ,, ,, 3 ,,
,, 1 ,, ,, 5 cases.

It appeared that in five of these houses the secondary cases were due to home infection. One patient infecting another within a few days of the first illness. In two houses two cases in each occurred simultaneously, and in one of the latter a third case occurred several months afterwards, and having no connection with the earlier cases. None were due to Hospital " Return Cases."

Although there still remains considerable difference of opinion regarding the influence of some etiological factors, such as season, climate and locality, on the prevalence or absence of Diphtheria, there is probably no zymotic disease on which so much brilliant scientific research work has been accomplished, and which has been followed by greater benefits to humanity. The bacteriology of Diphtheria is now well understood, and consequently its prophylaxis and therapeutics are being gradually reduced to an exact science in the form of antitoxin treatment. From our knowledge of the causal bacillus, Diphtheria is undoubtedly a highly contagious disease and transmissible from person to person chiefly through direct or contact infection, and all discharges from the mouth, nose, throat and breath of an infected person should be considered infectious.

Schools of all institutions afford a ready facility for the spread of infection. Here we have children at the most susceptible age brought in close contact for several hours per day, and too often in a moist unwholesome atmosphere with defective ventilation. These children are also frequently using the same articles in common, such as slate pencils, drinking vessels, towels, cloakrooms, etc., all of which also provide an indirect means of infection.

Again bacilli carriers play a prominent part in the spread of disease. We now know that many patients, after the usual three or four weeks' treatment at home or at hospital and apparently quite recovered, may still have the causal bacillus lodging in their mouths or throats, or nasal cavities, and quite capable of transmitting the disease to others.

Then there are the mild or missed, or undiagnosed cases ; so mild in themselves as not to be detected clinically, but still infectious to others ; and since no relation exists between the severity of attack in any two cases, the mildest case may impart fatal infection to another.

In consideration of these facts it is now the routine practice in many districts to search for " Carriers " among those who have been in contact with any one suffering from Diphtheria ; and undoubtedly this precaution must prevent many outbreaks. For in the case of schools where this practice is in operation, it is frequently discovered that not only are many contact children harbouring bacilli in their throats but sometimes also children where contact is not evident. Such children are potentially dangerous, and should be excluded from school, and not readmitted until on bacteriological examination swabs from their throats give a negative result.

It is now recognised that no one, whether actually suffering from the disease or a missed or a carrier case can be considered free from infection until at least one negative result has been obtained, and in some protracted cases not until two or three consecutive negative results are obtained. To carry out such investigations and precautions takes up much time and requires the assistance of a bacteriological laboratory. Still it has to be admitted that our present methods of controlling this disease are very inadequate, as the notification of every case usually suggests a clue where some unnotified cases may be tracked, and whose supervision is equally if not more important. If we are to exercise scientific control in limiting the spread of infection of this or any other zymotic disease, we cannot confine our energies to dealing with only notified cases.

The benefits of scientific knowledge in providing antitoxin treatment has within the past 15 years robbed Diphtheria of its former terrors in reducing the case mortality from one-half to one-third of what it was formerly ; and if purely scientific measures could be applied in the control of this disease it would result in a great reduction in its incidence, if not its ultimate extinction.

Antitoxin Treatment.

During the past 15 years clinical experience and scientific evidence have strongly emphasised the value of this treatment both as a prophylactic and curative agent. As a prophylactic it may be used in doses of 300 to 500 units for contact cases. In New York the usual practice is to immunise all members of a family who have been exposed to infection, and in Berlin the same practice is largely adopted. Its prophylactic power, however, does not appear to become established until at least 24 hours after infection, and appears to cease at the end of about four weeks. It may thus act as a prevention against immediate infection, although the immunity it confers is of short duration. As a curative agent in the treatment of Diphtheria it is the sheet anchor of the physician, and its value is best seen in the treatment of young children.

From a study of the records of many of our largest hospitals one finds that during the first four or five years of life the case mortality has decreased by at least one-half. It cannot, however, be too strongly emphasised that if the patient is to have the full benefit of this treatment it must be administered early. Statistics show that :—

Of cases treated on first day of illness, mortality per cent. almost nil
,, ,, second ,, ,, ,, 3 to 5
,, ,, third ,, ,, ,, 5 to 14

and after the third day its value is greatly diminished. It is, however, a difficult matter to get parents to realize the importance of having all cases of sore throats at once examined by a medical man, as they do not understand the too frequent danger of delay. Consequently, of the 41 cases removed to Marland Hospital, we find that frequently the medical man was not called in until the child had been a few days ill, and as an average three to four days elapsed between onset of illness and removal. On the other hand we readily admit that it is often difficult and even not prudent for the medical man to make a positive diagnosis without a bacteriological test, even although he suspects Diphtheria. In all such cases, however, antitoxin should be administered. Should the bacteriological test prove negative no harm is done, but should it prove positive, then the early antitoxin treatment may be the means of saving a life. Antitoxin is provided by this health authority free of charge to all medical men practising in this Borough.

Typhoid Fever.

The total cases were 18, and 16 houses were affected. In only one house did two cases occur. One of the cases was a nurse in Hospital.

In Table III. it will be seen that the heaviest incidence of this disease was in Castleton South and in Castleton Moor Ward, with five and four cases respectively, while in three wards there were no cases.

The houses in which the cases occurred were widely distributed through the Borough, four were back-to-back houses, and 14 were through houses, with an average of three rooms and scullery each.

Regarding closet accommodation, 14 of these houses had pail closets ; two were on the waste-water closet system, and only two had fresh water closets. The drainage appeared satisfactory only so far as could be made out without any proper test. The milk supply was different in each case but one.

When the cases are widely distributed both as regards locality and time of onset of illness, and consequently of a sporadic nature without any epidemic significance, infection by such media as milk and water is improbable, and it then frequently becomes a question of considerable difficulty to trace the actual source of infection.

In three cases the patients had eaten freely of mussels, shrimps, and watercress within one to three weeks of onset of illness.

Two were patients who had partaken of ice cream very liberally during a holiday, about two weeks before illness.

But although shell-fish from polluted areas are a frequent and dangerous source of infection, and watercress and ice cream in a less degree ; yet we could find no evidence of any others who partook of the same articles and who suffered likewise.

In another case the patient arrived in this town from Knutsford Jail about a week before onset of illness.

One case was a mother who nursed her son who was suffering from Typhoid Fever in his own house at Bolton, and on returning home was taken ill a week afterwards.

Another case was a boy, an inmate of the David Lewis Epileptic Colony, who was on a visit to his parents here. He arrived ill and had been ailing a few days previously. This was the beginning of an outbreak of 20 cases in that institution.

Two were evidently cases of secondary home infection ; one the case of a boy apparently infected through his father who was suffering from enteric, and both living in the same house ; and the other the case of the mother already mentioned who nursed her son at Bolton.

Although during the past year there were in this Borough only two evident cases of home secondary infection ; yet the moment is opportune to point out that infection by this means, or direct infection from one patient to another, is not only of graver importance but has probably in the past played a more prominent part in the spread of infection than has been as yet fully recognised. This is borne out by convincing evidence in a report on the origin and spread of Typhoid Fever in the United States Military Camps during the America-Spanish War in Cuba.

98 per cent. of the regiment's cases of Enteric appeared within six weeks after encampment ; and out of 1,608 cases studied, it was clearly proved in 62·3 per cent. of such cases that direct infection from one patient to another took place, either within the camp or from an adjoining camp. This is further confirmed not only by observations in English camps and hospitals, and by the study of some recent outbreaks in Germany and in this country, but also by Koch's, Treves and others, who are of opinion that this zymotic both in its endemic and epidemic prevalence is chiefly maintained by this means of infection. Then, just as in the camp, so in the home, and especially in small overcrowded homes, there is every facility for the rapid spread of infection from person to person. Accordingly, one frequently finds how rapidly infection takes place in one home while it may not spread to any adjacent home except through direct personal contagion.

Again the facility for the spread of Typhoid in an infected home is greatly increased by the difficulty often experienced in clinically diagnosing the first case, especially in the case of children, until the disease may have progressed one, two or three weeks, and during which time precautions against infection may not have appeared necessary.

In this respect, however, the following statement or Caigers dictum, is not without importance :—A fever which lasts a week without the appearance of any definite rash, or any local inflammation is almost always Typhoid.

Until recently the Widal reaction was chiefly relied on for settling the diagnosis, and when performed with all due precautions, it is reliable in 90 to 95 per cent. of all cases ; as one has to keep in mind that the blood serum in a typhoid patient does not react until about the seventh day of the disease and some times not until the second or third week. And further, we have now to recognise the Para-typhoid Bacilli, which set up a disease clinically indistinguishable from Typhoid Fever, but whose agglutinating reactions are very different and usually negative to the Bacillus Typhosus. Recent bacteriological investigations, however, have shown that the bacillus may be isolated from the blood in 90 to 95 per cent. of all cases during the first few days of illness.

That housing and sanitary conditions are eminently important factors in determining the prevalence of enteric, as of some other zymotics, is borne out in a study of the epidemic history of typhoid in England. During the past 30 years the decrease in the incidence of this disease has followed closely on general improvement in sanitation. To-day the greatest decrease is in those great towns of England where the greatest advance in sanitation have been accomplished, and the heaviest incidence now remains in those towns with defective drainage, with privies, pail closets, etc., and all such conditions as admit of the accumulation of filth and excrementitious matter about houses.

Of the rationale of this there is now much bacteriological evidence. The causal microorganism and its allies are now well understood ; and although we do not believe that insanitary conditions are the direct cause of typhoid, they are strongly predisposing factors in lowering the powers of resistance as has been shown experimentally in the case of rats and guinea-pigs. For in proportion as the bodily resisting powers are low, the frontal attacks of pathogenic microbes on the citadel of the human body are made all the easier, and if there are already breaches in the wall the easy conquest is too often assured. From amongst many English towns Ipswich provides a good illustration : Population 73,000. In 1881-1885 the death-rate from Typhoid was 0·16 per 1,000 of population ; number of deaths, 12.

The town at this time contained 8,000 privy middens, which were all abolished from 1894 to 1906, and the fresh-water carriage system adopted.

In 1908 the death-rate from Typhoid was ·01 per 1,000 of the population ; number of deaths, 1 ; a saving of 11 lives per annum.

Such conditions tend to make Typhoid endemic in any locality. In the town of Rotherham, with a population of 65,000, with 2,248 privy middens and 8,500 water closets, the persistent prevalence of Typhoid was made the subject of a special investigation in 1909, by an officer of the Local Government Board, who strongly comments on the heavier incidence and recurrence of the disease in streets and houses with privy middens, and came to the conclusion that these and the insanitary conditions always associated with them combine together to afford a ready opportunity for the perpetuation of the Bacillus of Enteric Fever. A report in almost similar terms has been issued regarding the Urban District of Ormesley.

Again from the Health Report for the City of Nottingham we find that from 1887 to 1908 the average incidence of Enteric Fever cases upon houses was as follows :—

Houses with pail closets ...	1 in 151
,, ,, privy middens ...	1 in 41
,, ,, fresh water closets	1 in 500

From the City of Birmingham and many other towns similar evidence is available.

Further, when we now recognise that there are often undiagnosed or missed cases, and especially in children, that there are unfortunately Bacilli " Carriers ;" and, that the fæces and urine at one time or another may be highly infective, and at all times potentially dangerous ; one is compelled to conclude that all such systems, where they exist, are a fertile means of perpetuation and propagation of the infection in urban communities. It readily allows the fouling of the whole surroundings of the home, and the pollution of food by dried and dislodged particles carried as dust by winds, and the fouling of all food-stuffs by hordes of flies, which settle and breed where filth abounds.

TABLE VI.

SCARLET FEVER, ENTERIC FEVER, AND DIPHTHERIA—

Percentage of Deaths to Sicknesses at each Age Period.

AGE PERIOD	SCARLET FEVER			ENTERIC FEVER			DIPHTHERIA		
	No. of Cases	No. of Deaths	Per-centage	No. of Cases	No. of Deaths	Per-centage	No. of Cases	No. of Deaths	Per-centage
Under 1 year	1	1	100·0	...	...	...	5	1	20·0
1—5 years	55	6	10·9	...	...	...	18	7	38·9
5—15 years	129	3	2·3	1	...	...	46	4	8·7
15—25 years	12	...	...	4	1	25·0	8	1	12·5
25—65 years	4	...	...	12	1	8·3	7	...	...
65 years and over ...	...	...	...	1	1	100·0	...	...	...
ALL AGES...............	201	10	5·0	18	3	16·7	84	13	15·5

Table VI. shows the incidence, deaths and case mortality for three zymotics at six age periods. Scarlet Fever and Diphtheria are pre-eminently diseases of childhood, although children under one year, and especially under three months are seldom attacked. With this exception the incidence of attack in both cases rapidly increases and reaches its maximum about the fourth and fifth year, while the case mortality increases from infancy to a maximum from the third to the fifth year of life. 50 per cent. of the deaths from Scarlet Fever occur under five years, and 90 per cent. under 10 years. After these age periods of childhood the incidence of these two zymotics decline steadily from year to year, as also the average severity of attack. These facts are well illustrated in the above Table, and shows two great advantages in protecting the child from infection during the earlier years of life :—

(1) Every year after the fifth he becomes less susceptible, and as age increases almost immune.
(2) Should an attack supervene, every year that it has been delayed proportionately reduces not only the immediate danger to life, but also the complications associated with these diseases.

Typhoid Fever on the other hand is not a disease of childhood, but of adult life ; and its period of greatest incidence and mortality is from the 10th to the 35th year of life. After this period susceptibility gradually decreases while case mortality increases.

TABLE VII.

SCARLET FEVER, TYPHOID FEVER, AND DIPHTHERIA—

Average number of Attacks and Deaths, with Attack Rate and Case Fatality per cent., in each Ward of the Borough during 6 Years 1903-1908, and 1909.

WARD.	AVERAGES, 6 YEARS, 1903-1908.												YEAR 1909.											
	Attacks			Attack rate per 1,000 of Est. Population			No. of Deaths			* Case fatality per cent.			Attacks			Attack rate per 1,000 of Est. Population			No. of Deaths			* Case fatality per cent.		
	Scarlet Fever	Typhoid Fever	Diphtheria	Scarlet Fever	Typhoid Fever	Diphtheria	Scarlet Fever	Typhoid Fever	Diphtheria	Scarlet Fever	Typhoid Fever	Diphtheria	Scarlet Fever	Typhoid Fever	Diphtheria	Scarlet Fever	Typhoid Fever	Diphtheria	Scarlet Fever	Typhoid Fever	Diphtheria	Scarlet Fever	Typhoid Fever	Diphtheria
CASTLETON NORTH	8·5	0·8	4·8	1·3	0·1	0·7	...	0·5	2·0	...	41·7	51·8	10	1	5	1·5	0·1	0·7	1	...	...	10·0	...	...
CASTLETON SOUTH	46·1	2·5	9·0	4·4	0·3	0·9	2·2	0·2	3·2	4·9	4·2	36·8	31	5	17	2·8	0·5	1·5	1	...	2	3·2	...	11·8
CASTLETON EAST	37·1	1·5	7·3	3·5	1·5	0·7	1·0	0·2	2·2	2·8	16·7	32·4	25	...	15	2·3	...	1·4	1	...	...	4·0	...	...
CASTLETON WEST	45·7	2·8	6·9	6·5	0·4	0·9	1·7	0·8	1·3	5·2	29·2	20·1	37	...	17	4·9	...	2·3	2	...	6	5·4	...	3·5
CASTLETON MOOR	56·2	1·8	15·0	7·6	0·2	2·0	3·2	0·7	3·2	5·0	20·8	23·5	30	4	5	3·6	0·5	0·6	1	...	...	3·3	...	...
SPOTLAND EAST	21·3	1·7	5·8	2·9	0·2	0·8	0·3	0·3	1·7	0·8	22·2	38·6	11	...	6	1·5	...	0·8	1	...	...	9·1	...	...
SPOTLAND WEST	26·0	3·2	5·3	3·1	0·4	0·6	0·5	1·3	1·2	2·2	40·0	26·4	16	1	3	1·8	0·1	0·3	1	...	1	6·3	...	33·3
WARDLEWORTH EAST	13·0	1·2	5·8	2·2	0·2	1·1	0·3	0·2	2·3	2·8	16·6	33·1	5	3	3	0·8	0·5	0·5	...	2	1	...	66·7	33·3
WARDLEWORTH SOUTH	26·5	3·3	4·8	3·1	0·4	0·6	1·2	0·5	0·8	3·4	15·0	15·5	14	2	7	1·6	0·2	0·8	...	...	1	...	...	14·3
WARDLEWORTH WEST	20·8	1·2	3·8	3·2	0·2	0·6	0·2	0·2	1·2	0·7	8·3	25·8	11	1	3	1·6	0·1	0·4	1	1	2	9·1	100·0	66·7
WUERDLE	19·8	4·8	6·0	2·8	0·7	0·8	1·3	1·2	2·0	9·0	34·2	39·4	11	1	3	1·5	0·1	0·4	1	...	...	9·1	...	...
BOROUGH	321·2	24·8	74·2	3·7	0·3	0·8	11·8	6·0	21·0	3·6	25·9	30·1	201	18	84	2·2	0·2	0·9	10	3	13	5·0	16·7	15·5

* The percentages in this column are the actual proportions of fatal cases to the attacks.

In Table VII. is set out for the different Wards the average number of attacks and deaths with the attack-rate per 1,000 of the estimated population, and the case fatality for the six years ending 1903-1908 ; and for purposes of comparison the figures for 1909 are given, as also those for the whole Borough. The attack-rate per 1,000 of the population combined with the case mortality are two definite criteria of the prevalence and severity of zymotic diseases ; and although the difference of incidence is not great in the different wards, yet it is distinctly heaviest in the Castleton area, and especially in the Castleton Moor Ward, during both periods. We cannot, however, attach too much importance to these slight transient waves of prevalence, as they are only as small waves superimposed on the greater waves of epidemic incidence. Further, in different wards there are probably differences in the predominant age periods ; and consequently in different wards there will be corresponding differences in the amount of susceptible material. In, however, comparing the figures for the Borough with those for last year, with the exception of a slight increase in the attack-rate of Diphtheria and the mortality-rate of Scarlet Fever, all the other figures for attack rates, number of deaths, and mortality rates for 1909 are considerably lower.

TABLE VIII.

SEVEN PRINCIPAL ZYMOTIC DISEASES—

Death-rates per 1,000, Est. Population during Ten Years, 1899-1908 and 1909.

DISEASE.	YEARS.										Average Annual Rate 10 years 1899-1903	Rate Year 1909
	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908		
SMALL-POX	...	...	...	...	**‡0·06**	0·01	...	...	...	...	0·01	...
MEASLES	0·32	0·45	0·06	**‡0·84**	0·05	0·49	**†0·01**	0·57	0·27	0·74	0·38	0·19
SCARLET FEVER	0·12	0·03	0·08	**†0·02**	0·13	0·16	**‡0·25**	0·15	0·04	0·08	0·11	0·11
WHOOPING COUGH ...	0·25	0·45	0·24	0·15	**‡0·49**	0·42	0·15	0·22	0·31	0·28	0·30	**†0·07**
*FEVER { Typhoid Typhus Continued }	0·12	0·04	0·10	0·06	0·08	**‡0·14**	0·06	0·09	0·06	0·10	0·09	**†0·03**
DIARRHŒA	0·46	0·34	0·58	0·21	0·32	0·63	0·52	0·58	0·11	**‡0·98**	0·47	**†0·09**
DIPHTHERIA	0·17	**†0·09**	0·19	0·11	0·25	0·21	**‡0·30**	0·23	0·25	0·21	0·20	0·15
TOTAL ZYMOTICS	1·45	1·40	1·25	1·40	1·38	2·07	1·30	1·85	1·04	**‡2·40**	1·55	**†0·64**

‡ Highest 11 years
† Lowest ,, ,,

* Chiefly Typhoid, and including Para-Typhoid Fever.
No deaths from Typhus Fever during years 1899-1909.

Table VIII. gives the death-rates of the seven principal zymotic diseases per 1,000 of the estimated population during 1899-1908, with the average for this period and the rates for 1909. The highest and lowest rates are in heavy figures. The summation of the table is that the zymotic death-rate for Rochdale during the past year is the lowest on record. It is 58·7 per cent. below the average for the last ten years, and 73·3 per cent. below the rate for 1908.

TABLE IX.

TOWN	Average Annual Attack-rate per 1,000 of estimated population—3 years, 1907-1909.			Seven Zymotic Diseases Death rate per 1,000 of population.	
	Scarlet Fever	Diphtheria	Enteric Fever	5 years 1904-1908	Year 1909
BURY	2·96	0·90	0·25	1·57	0·98
PRESTON	1·86	0·51	1·05	2·58	1·20
WARRINGTON	4·69	1·58	0·49	3·00	2·90
WIGAN	4·14	0·51	1·12	1·80	2·47
ST. HELENS	6·78	2·33	0·76	2·36	3·50
OLDHAM	3·84	0·51	0·22	2·30	1·10
HALIFAX	2·46	0·97	0·48	1·04	0·77
STOCKPORT	5·02	0·58	0·40	2·71	1·73
BLACKBURN	5·26	0·86	0·53	1·90	1·50
BURNLEY	4·64	0·75	0·49	3·10	1·42
BOLTON	4·07	0·46	0·85	1·98	1·08
BOOTLE	5·60	0·92	0·48	2·50	2·10
AVERAGE 12 TOWNS	4·28	0·91	0·59	2·24	1·73
ROCHDALE	2·25	1·01	0·21	1·73	0·64
ENGLAND AND WALES	...	...	...	1·55	1·12
76 GREAT TOWNS	...	...	...	1·95	1·42
142 SMALLER TOWNS	...	...	...	1·56	1·08
RURAL DISTRICTS	...	...	...	1·09	0·80

The concluding Table IX. shows the position of Rochdale in regard to other neighbouring and approximately comparable towns, as also in regard to the zymotic death-rates for England and Wales, the 76 great towns, the 142 smaller towns and rural districts.

The attack rates are worked out for three years, the zymotic rates for five years, and the figures for 1909 are given. Without adverting to the many features of contrast in this Table, which are clearly set out, we may note the high incidence of Diphtheria during the past year in this town, the low incidence of Scarlet and Typhoid Fever, and further, that the zymotic death-rate in Rochdale during the past year was the lowest, not only amongst the Lancashire towns, but lower than the zymotic rates for England and Wales, the 76 great towns, the 142 smaller towns, and the rural districts of England.

TABLE X.

ROCHDALE INFECTIOUS DISEASES HOSPITAL.

Return of Patients for Year 1909—Marland Hospital.

DISEASE	In Hospital on 31st December 1908	Admitted during the Year	Discharged	Died	Remaining in Hospital at end of Year	Average stay in Hospital of Patients Disch'rg'd — Days	Ages of Patients Admitted		
							Under 5 Years	5—15 Years	Above 15 Years
SMALL-POX	...	1	1	...	...	37	...	...	1
MEASLES	...	...	...	...	...	...	...	...	...
SCARLET FEVER	13	146	124	7	28	48	51	80	15
DIPHTHERIA	3	43	39	7	...	28	16	17	10
TYPHOID FEVER	2	16	14	2	2	40	...	3	13
TYPHUS FEVER	...	...	...	...	...	...	...	...	...
ERYSIPELAS	...	...	...	...	...	...	...	...	...
WHOOPING COUGH	...	...	...	...	...	...	...	...	...
PUERPERAL FEVER	...	...	...	...	...	...	...	...	...
Epid. Cerebro-Spinal Meningitis	...	...	...	...	...	...	...	...	...
Total Zymotic Cases	18	206	178	16	30	...	67	100	39
In Quarantine	...	6	2	3	1	...	1	...	5
TOTAL	18	212	180	19	31	...	68	100	44

The above Table includes cases admitted from the Borough of Middleton, and from the Union Workhouse.

Average daily number of patients in Hospital — 22, of whom 12 were males and 10 females.

Number of cases admitted from outside the Borough—23

Number of deaths among such cases—3.

Maximum daily number of patients in Hospital 39, November 18th and 19th.

Minimum daily number of patients in Hospital 10, July 24th, 25th and 26th.

The total admissions during the year were 212, as compared with 190 during last year, and 292 the average for five years, 1904-1908.

By arrangement with the adjacent County Borough of Middleton and the Union Workhouse Authorities, infectious cases from these places are received into Marland Fever Hospital.

The case of Small-pox included in the Hospital Table was a Middleton case, admitted on April 3rd and discharged on May 10th after making a good recovery. The patient was a woman, 40 years of age, who had been well vaccinated in youth, and was engaged as a Card Room operative. It so happened, however, that there were three Rochdale contact cases. These were re-vaccinated and kept under supervision ; and seven of the Hospital staff were re-vaccinated.

By referring to Table III. the numbers removed to Hospital are given in the wards from which they were taken. There were 135, or about 65 per cent. of all the scarlet cases ; 41, or 48 per cent of all Diphtheria cases, and 11 or about 60 per cent. of the Typhoid cases. Hence, of all the notified cases of these three zymotics about 60 per cent. were treated in the Hospital.

The extent to which hospital isolation obtains in different towns where hospitals are provided varies in a remarkable degree. In some it is almost complete, where 90 to 95 per cent. or more are removed to hospital, while in others not 50 per cent. are removed.

On this question it may be said, speaking generally, that if the house is such as can provide sufficient accommodation for isolation, and if one is satisfied that it will be properly carried out, then there is no urgent need for removal to hospital. But if on the other hand the case is in a small one, two or three-roomed house, it is very difficult to satisfy ones own mind that efficient isolation can be maintained or carried out in such a way as to prevent the spread of infection by different channels.

Of the 135 cases of Scarlet Fever treated in hospital, about 90 to 100 were of a mild type, while many of the remaining third were of a very severe type, with complications of which the predominant were scarlatinal rheumatism and complications of a septic nature. In only a few of the cases could the cause of death be attributed to Scarlet Fever alone. As regards many children who die from some zymotic disease, death would not have occurred but for some manifest debility or constitutional ailment which the fever accentuated and which accelerated death.

Regarding the deaths from Diphtheria, three died an hour after admission, and before any benefit could be derived from the antitoxin treatment. I have already adverted to the value of early antitoxin treatment both from the prophylactic and curative aspect.

The two deaths from Typhoid Fever were Middleton cases.

Return Cases.

When a patient is discharged from hospital as presumably free from infection, yet on returning home and within a period of one month apparently infects others, who in due course may be removed to the hospital, these are designated " Return Cases." During the past year there were four or 3 per cent. of such possible or return cases of Scarlet Fever in Marland Hospital. The average for the chief towns of England varies from 2 to 3 per cent. up to 12 per cent., and depending chiefly on management and epidemicity. It has to be kept in view, however, that this is not a purely hospital phenomenon. Cases nursed at home on apparent recovery and release from isolation under similar circumstances are just as liable to be the cause of secondary infection. When such occurs at home usually no one feels aggrieved, but when it can be presumably connected with a primary case returned from hospital, then there often arises in some minds the impression that some carelessness or want of sufficient precaution has occurred, and usually some one discovers a grievance against the hospital administration.

It may be at once admitted that there are genuine return cases in every hospital where Scarlet Fever is treated ; where secondary infection was possibly due to a previous member returning home from hospital bearing potential infection, which in certain circumstances may have become actively infectious. But on the other hand there are many labelled " Return Cases " about which there is no absolute proof whatever. Many such are undoubtedly infections coincident within a month of the return of another member from hospital, and quite possibly due to any one of a complex of sources, and especially is this true in regard to children attending schools and moving about in public places. How frequently do we find the discharge of a patient owing to some slight complication, delayed for a few days, and during which interval some other member of the same family is admitted. The coincidence of the two things together, alters the designation of the second case and saves the hospital from being credited with a return case. Another important source of secondary infection is undoubtedly the house itself, clothes, books, toys, etc., any of which may not have been thoroughly disinfected, and as sometimes discovered some of which articles were withheld from disinfection. Since the causative microbe is still undiscovered we cannot reasonably be too dogmatic regarding all its possible means of propagation and dissemination, and therefore to the honest enquiring mind as regards many sources of infection, it is often difficult to discover from whence it cometh or whither it goeth.

The admission of potentially infectious cases discharged from hospital, and which may cause secondary home infection or return cases now require some consideration. We call them potentially infectious because no child is discharged from hospital with any apparent possibilities of infection except by special arrangement with its parents or guardians.

This formed the subject of two special investigations by the Metropolitan Asylums Board, London, and from valuable evidence obtained thereby, as also from the experience of Fever Hospitals throughout the country, and from many careful observers and enquiries, there is a consensus of opinion that there is no evidence that desquamation of the skin, after four or five weeks retains any power of infection, although probably infectious in the earlier stage of the disease ; and there are some who go further and consider the infectivity of desquamating skin in any stage as exceedingly problematical. It may yet be proved that desquamation *per se* is not a source of infection, and that heretofore it has received too much consideration. Still, there are many other circumstances, both from the clinical and public health point of view, which rather justify our acceptance of the first view as the safer course meantime to adopt in practice. One effect of this change of opinion, however, has been to shorten the period of detention in many hospitals. In some hospitals this has been reduced to about a month. This, however, I think is too short a period of isolation as it does not carry the patient beyond the stage at which some of the worst complications often supervene. The safest course appears to be to consider each case on its own merits ; and in my own hospital practice, if the patient has made a satisfactory recovery with no complications, I consider five weeks and certainly not more than six weeks after the appearance of the rash as a reasonably safe period of isolation ; and it has to be noted that in hospitals where this practice of shortening the period of detention is in operation the return cases have decreased, while at the same time it has a proportionate economic value. But more importance and difficulty is connected with all cases where such complications as Ottorrhœa, Rhinorrhœa and Adenitis have supervened, and which usually cause a longer detention in hospital, because there is every reason to believe that the chief seat of infection in the later just as in the earlier stages of the disease is in the nasal cavities, the throat and adjacent glands. As evidence of this, it is the experience of many English and Scottish hospitals, and certainly in accordance with my own, that secondary or return cases occur much more frequently in homes where the primary case had suffered from one or other of these complications.

At the same time one frequently finds in investigating return cases that the primary and alleged infecting case had none of these complications, and also perfectly free from desquamation before discharged from hospital. The explanation appears to be that, although the chief seat of infection is now established with considerable certainty, the causative germ has not yet been discovered ; and, consequently, as we are ignorant of its ways and manners, we are therefore reduced for practical purposes to the assumption that after the elapse of five or six weeks isolation, a patient is probably free from infection, who either has had no discharges or who has recovered from such at least 14 days before discharge. This is probably quite true as regards any active infection ; and if still any lingering or potential infection, it would probably remain inactive and gradually disappear if the discharged patient were properly treated and proper precautions taken to prevent colds, etc., during the two weeks following discharge. But what too frequently happens is, especially in the case of children, that sufficient precautions are not taken, and with the result that colds, etc., do supervene, which are usually followed by discharges from the nose and throat, and the child may now become actively infectious. This condition supervenes more readily in winter, and if patients are discharged from the warm wards, or after a warm disinfecting bath, especially on a cold damp day.

The question then arises, can " Return Cases " be prevented I think under present conditions it is impossible when one has due regard to the arbitrary way in which cases are labelled " Returns," but I am of opinion that it is possible to reduce the possibilities of secondary infection or genuine " Return Cases " to a minimum.

Many of the fever hospitals in use to-day were constructed at a time when our knowledge of the best methods of administration and treatment was not so advanced as it is to-day ; and in some cases it may have happened that advantage of available science in the structural arrangement of such institutions was not always taken. In every fever hospital the ward and structural arrangement should be such as to provide for the complete separation of acutely ill and convalescent patients. These two groups should again be differentiated at least into ordinary acute cases and septic acute cases. These last ought always to be separated from the former, and provision made by small or side wards for their reception. Then the convalescent should by stages be gradually inured to the conditions of ordinary life, which they are to return on leaving hospital. Accordingly, the practice of giving each patient a hot disinfecting bath on the day of or immediately preceding dismissal should be abolished, such bath may be given the evening before dismissal. Then in the treatment of ordinary zymotics not only do we now recognise the value of suitable and guarded open-air treatment, but for all septic cases the value of open-air and sunlight has been strongly demonstrated ; and provision for such treatment should be provided and encouraged. Then it must be stated that without efficient internal administration these or any other provisions will be rendered almost nugatory. Too frequently the internal administration fails to exhibit the study of those liberal, yet economical principles of housekeeping which are so essential for the well-being of patients and staff ; but at the same time it has to be admitted that fever hospitals are often understaffed and very poorly equipped, which conditions militate against good management.

Again, it is difficult to impress the general nursing staff of the possibilities of personal contagion, and of aseptic nursing ; and that infectious disease is chiefly spread by the former ; whereas if the latter could be scrupulously carried out and the former prevented, then the different zymotics such as Scarlet Fever, Diphtheria and Typhoid Fever, might be safely nursed in the adjoining beds in the same ward. Consequently all septic cases should as far as possible be under the charge of a reliable nurse, so as to prevent septic infection being carried from patient to patient by instruments, ward utensils, toys, hands of nurses, etc. All feeding utensils and cutlery should be scalded by steam, and thereby sterilized after each meal ; and any interchanging of the articles of each patient's hospital out-fit should be prohibited. Every precaution should thus be made to prevent septic and cross infection. For as already stated, it takes place most readily among the constitutionally debilitated, and consequently such cases usually require longer detention in hospital, and are a source of anxiety when discharged. Good and free ventilation should obtain in every fever ward, which, as opportunity presents itself, should be closed for a week or two with doors and windows thrown open, and thoroughly disinfected.

Printed instructions should be supplied to every parent or guardian, pointing out amongst other things that the discharged patient should not be allowed for some time to sleep with any one who has not had Scarlet Fever, and to have as little contact as possible with other children for at least two weeks.

This then leads up to the much debated question of the utility of isolation hospitals. I think every one will admit who has had any experience of hospital administration that such an institution requires not only the directing judicial mind, but also very active and efficient practical management. Consequently, it is quite possible to have an infectious diseases hospital with all the defects and evils with which they have been credited by their hardest critics. Further, one readily admits that some of the more extravagant conceptions held at the time of the initiation of fever hospitals have not been realised ; but, when it is alleged that they have not been instrumental in reducing the incidence nor the death-rate of Scarlet Fever ; and that the so-called hospitalization of Scarlet Fever not only frequently produces a severer type of the disease, which requires longer detention and is followed by a higher case mortality ; and is also the cause of more secondary and fatal infection on the return home of hospital cases than what arises from cases nursed at home ; I venture to think that any one who makes an impartial and critical study of the literature and evidence on which these allegations are founded must come to no other conclusion than that the case against the hospitals stands not proven.

Much of the statistical evidence brought forward covers too limited periods and is based on factors which are themselves continually changing, and not infrequently some of the results arrived at might just as logically be due to any one or more of a complex of factors, the operations of which have either not been excluded or have not received adequate consideration. Statistics which attempt to express the utility of Infectious Diseases Hospitals in terms of the attack-rate per 1,000 of the estimated population instead of in terms of the susceptible population exposed to infection ; and which likewise, amongst other things, do not give sufficient consideration to the proportions, class, and age periods of patients removed to hospital and those susceptible remaining at home and nursed at home ; also the practice of removal as to onset of illness and date of removal ; methods of disinfection and by whom ; the effects of overcrowding in poor homes with more susceptible material and of school attendance ; method of dealing with contacts, etc., cannot be considered sufficient to establish the case against isolation hospitals ; and further, it appears doubtful if such can be proved by purely statistical methods, when so many factors have to be eliminated or qualifications made before the results are of any comparative value.

Whatever value is to be put on Isolation Hospitals for the part they have played in the past in diminishing zymotic disease, and whatever their destiny in the future may be ; no one can but recognise that the incidence and virulence, as also the case mortality, of most zymotic diseases is to-day greatly modified and diminished, when one thinks of the epidemic virulence of these diseases in pre-Isolation-Hospital days, when little or no provision was made for the isolation of infectious cases ; and further, that whatever means is taken by hospital isolation or otherwise to isolate infectious cases and thereby limit the spread of infection which takes place both directly and indirectly in many diverse ways, can have no other result than tend to reduce the incidence of the disease.

Measles.

By referring to Tables I. and III., it will be seen that during the past year there were 101 cases of Measles discovered and there were 17 deaths. But it may be at once stated that as this disease is not notifiable, we have no reliable statistics regarding its incidence, only the number of deaths may be considered reasonably accurate. Measles is a zymotic of very ancient origin, and has become almost pandemic with a marked tendency to assume an epidemic character at intervals of two or three years. It would, however, be unsafe to argue from the available figures in Table 1., where we stand at present in relation to the epidemic wave. In 1907 and 1908 only 60 and 80 cases were known to the Health Department, with 24 and 66 deaths respectively ; but this cannot be the true relation of incidence to case mortality. At present cases of Measles come under our notice chiefly through the Education Office, and although during the past year some arrangements were made whereby notification through this office might be made more complete, yet I am satisfied that a considerable number of cases still remain un-notified. In this way Measles is still allowed to run its epidemic course without any serious attempt at control by such means as isolation and disinfection ; which have been adopted in regard to Small-pox, Typhoid Fever and Scarlet Fever. Consequently, to-day, Measles does not share in the marked reduction in mortality which these other diseases exhibit. But on the other hand it has to be admitted that the success of preventive measures against Measles is very doubtful since the disease is probably not conveyed by the media of water, food, or milk. The incubation period is long, about 12 days, and during the greater part of this time, while the discharges from the mouth, nose and eyes, and especially the breath in coughing and sneezing, are all infectious, other members of the household or school may become infected before the primary child becomes so ill or the rash appears so as to suggest the disease, and consequently isolation cannot be adopted sufficiently early, in many cases, to prevent the spread of the disease. This is all the more regrettable because Measles is pre-eminently a disease of childhood, and 90 per cent. of all deaths from Measles are amongst children under five years of age. The second year of life shows the highest mortality, after which it rapidly decreases in each succeeding year. The seasonal incidence, although not well seen in Table IV., is very well marked in this disease with its maximum in the winter months and its minimum in late summer or autumn.

At present when cases of Measles come under our notice, if apparently necessary, they may be visited by the Lady Health Visitor and advice given. Also all houses are disinfected when application is made by the householder to this department. It is now pretty well established that the school room is a central focus of infection for Measles ; and hence arises the frequently discussed question of the advantages of school closing with the hope of checking a threatening epidemic. In rural districts there may be a distinct advantage, and in towns much good may be done by early closing of the infant departments, although I do not think anything is usually gained by closing the middle or upper schools. In this respect, however, I am persuaded that there would be less Measles and certainly less fatal Measles if children were not sent to school before the age of five years ; and in future it appears advisable that more attention should be given not only to the cleanliness and ventilation, but to proper methods of disinfection of schools, which can be done at a trifling cost, and at the same time have a certain economic value in improving attendance by preventing sickness.

Whooping Cough.

This disease, being also non-notifiable, our chief source of information is through the Education Office.

In Table I. is set forth what statistics are available for the past 19 years ; and in Table III. is contained the ward incidence and mortality ; while Table IV. shows the seasonal incidence of the disease. There were six deaths, all under five years of age, from amongst 98 cases of the disease which were brought under our notice.

This is a zymotic of world-wide distribution, and occurs with its average seasonal prevalence during the late months of the winter and the early months of spring. Like Measles, Whooping-cough has a tendency to recur at irregular intervals of two to three years ; and very frequently epidemics of both Measles and Whooping-cough run concurrently. The chief incidence of attack falls on children of one to five years ; and by far the greatest mortality falls on the first year of life—which is about 40 per cent., with 75 per cent. under two years, and 96 per cent. under five years. Whooping-cough and Measles together are responsible for more deaths of children than all the other infectious diseases put together.

There is no reason as yet to believe that infection is in any way transmitted through the medium of water, milk or other food-stuffs. Infection is probably acquired in all cases by the inhalation of some as yet undiscovered micro-organisms, and this infection is given off from pre-existing cases by breathing, sneezing, fomites, and all discharges from mouth, throat and nose.

Consequently, no factors of which we are aware appear to exercise greater influence in increasing the susceptibility of children, in facilitating its spread, and in increasing the case mortality, than bad domestic sanitation and social conditions. For in sorting out the cases we usually find that the mortality rate has a direct correlation with these conditions, and especially with small overcrowded homes.

It is a matter of much difficulty to get parents to understand not only the immediate but more especially the future underlying dangers in what is popularly known as only an attack of Measles or Whooping-cough, and consequently children affected so frequently do not receive the care and attention necessary to bring about complete restoration to normal health.

The lung tissue appears to be most susceptible and to suffer most from the toxic effects of these diseases ; and indeed of many of the children who die, death is nearly always finally due to some form of Bronchitis or Pneumonia. But this does not measure the mischief. Of many of those children who apparently recover, the lung tissue does not so recover as to return to its normal condition, and it now remains for the rest of life at a lower level of vitality, and consequently more susceptible at all times to attacks of respiratory diseases—especially Phthisis or Consumption, for which the toxins of these diseases seem often to prepare the way. I can have no hesitation in saying that the beginning of many an adult case of Consumption was in an attack of Measles or Whooping-cough.

One regrets that it has not as yet been found practicable to bring two such fatal diseases as Measles and Whooping-cough more directly under the control of preventive medicine.

The considerations and difficulties here are precisely the same as discussed under Measles, the long incubation period, and the insidious onset of symptoms of an apparently ordinary nasal or bronchial nature, with the absence during the early stages of the characteristic paroxysmal whoop all tend to obscure the disease while all the time the child is infectious to others,

Few statistics are available as regards the results of any more or less complete system of notification and hospital isolation ; but I might say that in the City of Aberdeen under a local Act, these diseases were compulsorily notifiable until recently, and from careful records we learn that, whereas in the earlier years of notification the mortality rate was 10·5, in the later years it had fallen to 3·6.

Our administrative procedure at present consists in giving instructions by card or visiting, or both, in all cases where such is considered necessary ; also the supply of disinfectants or the offer of disinfection of the house by the sanitary staff.

Varicella or Chicken-pox.

The number of cases of this disease brought under our notice or received through the Education Office was 125 ; and no deaths were recorded. . In Tables III. and IV. is set out the incidence of the disease in the different wards, and in the different months of the year. The mortality from this zymotic is practically nil, except when it appears in its more malignant form—varicella gangrenosa ; and its notification only becomes of administrative importance during epidemics of Small-pox, which in many ways simulates varicella.

Cerebro-spinal Meningitis.

As seen from Table III. there was only one case of this disease reported during the past year—the case of a child who died very suddenly.

This country for a considerable time has been remarkably free from this disease, although during the 18th century there were many severe outbreaks in different parts of Europe and America. But in these days, before the dawn of bacteriological science, although the disease presented well marked signs and symptoms, and with a case mortality from 50 to 90 per cent., the etiology of the disease as to its cause, means of propagation, prophylaxis and treatment were not, and could not be properly understood.

Now through the researches of Weichselbaum, Gordon and others we now know that this is an infectious disease, occurring often in sporadic outbreaks, and less frequently in epidemic form. That the causative micro-organism is the diplococcus intracellularis meningitidis Weichselbaum. The name is descriptive after its discoverer. The organisms (for brevity called meningococcus) occur usually in pairs, and they are generally found within the cells and cause an acute inflammation of the membranes which surround the brain and spinal cord.

A further opportunity has presented itself for the study of this disease in the new light of bacteriological science during the recent severe outbreaks of this disease in the Midlands of Scotland, especially in Glasgow, where in 1906 there were 213 cases and 148 deaths, and extending with diminished severity to Edinburgh and Aberdeen. Besides confirming the meningococcus as the causative micro-organism, which was found not only present in the fluids and membranes surrounding the brain and spinal cord, but also in the naso-pharynx of the majority of the patients.

Then continuing this line of research and examining the contact cases of those who had been in close contact with patients suffering from the disease, the important discovery was made that out of 308 contact cases in Glasgow no less than 81, or 26 per cent. were carrying the meningococcus likewise in the naso-pharynx ; and further that these 81 " carrier " cases were chiefly older members of the household ; 32 were parents ; 39 were older brothers and sisters, and 14 were grandfathers, grandmothers, uncles, lodgers and visitors ; and of special significance is the fact that not one of these adult carriers of the meningococcus developed the disease.

This last important discovery is a great advance in the study of the epidemiology of this disease, and its further development will probably clear away much of the mystery with which the sporadic outbreaks and spread of this disease has been surrounded in the past.

Thus, since experience has shown that the chief incidence and high case mortality falls on children from 1 to 15 years of age, we may at least make this provisional statement that, while adults may be carriers of the micro-organisms, and while not themselves readily susceptible to the disease, yet they may provide a source of potential infection, which may readily enough be transferred from parent or adult to children who are very susceptible and in whom the disease is most fatal.

This conclusion tends to bring at least one of the sources of infection in this disease in line with the recent discovery of " carrier cases " in some other infectious diseases, although concerning its fuller etiology we have yet a great deal to learn.

Regarding Treatment.—Until within the last few years it may be said there was no specific or curative treatment to offer. But bacteriological science has again come to our aid, and the treatment which offers the most promise is the serum-treatment.

Of the different sera in the market, Flexner's has undoubtedly given the best results ; and much of this serum has been supplied gratuitously by the Rockefeller Institute of America to public institutions. The proper technique of this method of treatment, however, must be carefully observed.

Zymotic Enteritis or Epidemic Diarrhœa.

This is by far the most fatal of the zymotic diseases in infancy, and most fatal from the third to the ninth month of the first year of life ; its seasonal incidence falls in the third quarter of the year, and it causes an infantile mortality for the whole country of nearly 25 per 1,000 births.

In 1908 there were 84 deaths from this disease, and the yearly average number of deaths for the preceding five years is 49 ; while during 1909 the number of deaths is 8, the smallest number on record.

It is eminently a disease of towns in which the mortality is twice as great as in the rural counties ; and is especially associated with the worst features of density of population and overcrowding, which conditions again are frequently associated with lack of cleanliness, and improper feeding through the lack of knowledge of the dietetic value of milk and proper food-stuffs, as also their cooking and preservation from pollution, and such other conditions and associations as are conducive to domestic and maternal neglect.

In many manufacturing towns, some of which in Lancashire, the seasonal incidence of this disease may be said to determine whether the infantile mortality for the year shall be high or low ; and so close is this relationship that this disease has been made a subject of special investigation both from the clinical, bacteriological and public health administrative point of view. In my report on Milk Supplies (App. p.p. 19) these questions are discussed at some length, and will not be further referred to here.

The relation of temperature and rainfall to epidemic summer Diarrhœa has also been a subject of close observation for many years, and has amongst others been specially investigated by Ogle, Ballard and Newsholme. The latter comes to the following conclusion, and with which the others are in general agreement, that epidemic Diarrhœa is chiefly due to want of cleanliness, and accumulations of surface pollution in and around houses, by which not only the surface but the subsoil becomes polluted ; and given any two towns of comparably equal social and sanitary conditions, their relative diarrhœal mortality will be proportional to the height of the temperature and the deficiency of rainfall for each town, especially the temperature and rainfall of the third quarter of the year. On this theory the rise of temperature favours the activity and multiplication of the micro-organisms in such polluted areas, when by various means, such as contact, dust, flies, etc., they get abroad to contaminate food, milk, etc. Hence, rise of temperature with deficient rainfall are probably the two chief external conditions favourable to epidemic or summer Diarrhœa ; while on the other hand a plentiful rainfall has a cleansing effect on the atmosphere and allays the dust, while at the same time, by lowering the temperature of the air and soil, it tends to inhibit the multiplication and dissemination of soil micro-organisms.

Referring to Chart B there is recorded graphically by means of curves the average weekly air temperature, the weekly mean temperature of the 4-foot earth thermometer, and the weekly average rainfall in inches ; and these are further correlated with the weekly number of deaths from Diarrhœa and all other diseases. In this Chart it will be seen that the highest mean weekly temperature of the air (nearly 65° F.) was reached in the second week of August ; but the highest diarrhœal mortality does not usually coincide with the period of highest air-temperature, but the period immediately following the highest temperature recorded by the 4-foot thermometer, and not in any case until this mean temperature has reached about 56° F.

This last fact we are pleased to state is not illustrated in the Chart B as it would be in a similar Chart for 1908, when the highest 4-feet earth temperature (58·2° F.) of that year was reached in the first week of August, and followed by an outbreak of epidemic Diarrhœa, and which caused 54 deaths during the next nine weeks. In the 1909 Chart the Diarrhœal deaths are cross-marked and are only eight in number, the lowest on record for this town and of no epidemic significance.

Then tracing the curve of 4-feet earth temperature we find a gradual rise from April to August, when it reaches in the third week of this month the highest weekly mean of the year, 58·5° F. Likewise tracing the curve of rainfall it will be seen that during this week of highest 4-feet earth temperature there was nearly two inches of rainfall, and that although during the second week of August the period of highest weekly mean air-temperature (65° F.) the rainfall was low, still the preceding month of July was on the whole a wet month.

Again referring to the Meteorological Table V. of Section I. although, as will be seen, 1909 was on the whole wetter, cooler and more windy than 1908 (conditions which favour the inhibition of outbreaks of Diarrhœa) with a rainfall about seven inches higher, and a mean temperature of nearly 2° F. lower, yet the records of quarterly statistics show that during the third quarter of each year the rainfall was almost the same and about 13 inches, while the range of temperature was about 1° F. lower for 1909.

Hence, although the high Diarrhœal death-rate of 1908 may be partly due to climatic factors differing in some degree from 1909, it has to be kept in view that they are only of relative importance ; and that undoubtedly of more importance as determining factors are the home and all its domestic relations, and of these the chief is the food-factor—polluted food and improper feeding.

Tuberculosis.

Tuberculosis in its various forms, such as Pulmonary Tuberculosis, or Phthisis, or Consumption in adults ; and Tabes Mesenterica or Consumption of the Bowel and Tubercular Meningitis or Consumption of the Brain, both common to children ; and in its glandular and skin forms such as Scrofula and Lupus, is one of the most widespread diseases which affects the human race. For no race is exempt and geographical position has little influence. The ravages of this disease in times gone bye and even to-day are enormous. The annual hecatombs are vaster than the vast offerings sacrificed yearly to all the other acute infectious diseases. (Table XI.)

This disease, although no respecter of persons and claims its victims from all ranks and classes, is eminently a disease of poverty and destitution. Its incidence falls heavy on the working classes, but heaviest on those who have sunk to the low level of poverty and destitution. But, unlike Pneumonia, which has sometimes been termed the old man's friend when he is taken off by it in an acute and short illness ; tuberculosis is a characteristically slow and chronic disease, and there are few of the poorer or even middle-class families who can escape the cold gradations of physical and financial ruin ; when as often happens the bread-winner is crippled with consumption for years, and when or even before he dies the maintenance of his family and dependents often falls on the community.

Table XI. gives the deaths from tubercular diseases at various age periods during the year 1909, and also the average number of deaths during the same periods for the preceding eight years ; and with these may be compared the total deaths from the seven principal zymotic diseases, as also from all causes.

From this Table one gathers that during the period under review there has been no appreciable change in the death-rate from tuberculosis during the preceding eight years ; while during the year 1909 the death-rate shows an appreciable reduction.

In the former period, of every 10 deaths in Rochdale, one was due to tuberculosis ; while during the latter one in 12.

There can be no doubt, however, that owing to difficulties of diagnosis, classification and nomenclature, these figures do not bring out the relative and true ratio of tuberculosis to other diseases. From pathological and other evidence it is very probable that many deaths amongst children registered as due to such ill-defined causes as diarrhœa, wasting, atrophy and debility were due to some obscure form of tuberculosis ; and many deaths registered as due to some zymotic undoubtedly would not have occurred but for a preceding and underlying tubercular condition.

Again from the Table it will be seen that the heaviest incidence of the disease falls on the adolescent and adult periods of life ; whereas the great majority of those who die from zymotic diseases are children, whose deaths, although regrettable, yet are not so great a loss to the community, nor do they cause the same economical disturbance for the home.

TABLE XI.

Deaths at various Age-periods from Tubercular Diseases during year 1909, with average for preceding eight years, 1901-8, compared with deaths from Zymotic Diseases and All Causes.

AGES	YEAR	NUMBER OF DEATHS					Proportion of Deaths to Deaths from All Causes	
		Phthisis	Other Tubercular Diseases	All Tubercular Diseases	Seven Zymotic Diseases	All Causes	Phthisis	All Tubercular Diseases
ALL AGES	1909	97	27	124	57	1442	1—15	1—12
	1908	122	44	166	213	1632	1—13	1—10
Average	1901-8	115	42	157	137	1512	1—13	1—10
UNDER 5 YEARS......	1909	2	16	18	44	327	1—163	1—18
Average	1901-8	2	19	21	112	430	1—215	1—20
5-15 YEARS	1909	4	3	7	9	47	1—12	1—7
Average	1901-8	3	10	13	14	57	1—19	1—4
15-25 YEARS	1909	11	3	14	2	50	1—5	1—4
Average	1901-8	18	4	22	3	61	1—3	1—3
25-65 YEARS	1909	72	5	77	1	595	1—8	1—8
Average	1901-8	85	7	92	6	608	1—7	1—6
65 YEARS AND OVER	1909	8	...	8	1	423	1—53	1—53
Average	1901-8	7	1	8	2	356	1—51	1—45

Phthisis.

Notifications of Phthisis.

Notifications are either voluntary or compulsory, and during the year 1909 there were notified 107 cases.

Voluntary Notifications.

Under this arrangement 13 cases were notified, but two of these were also notified under the following regulation.

Compulsory Notification.

This only relates to cases occurring amongst the inmates of Poor Law Institutions or amongst persons receiving out-door relief from the Board of Guardians ; and came into operation on the 1st January, 1909, in virtue of the Public Health (Tuberculosis) Regulations, 1908. Under these regulations 96 notifications were received—60 under Form A (notifications by Workhouse Medical Officer); 36 under Form B (by District Medical Officer) ; and of these 32 cases were notified more than once.

Under Forms C and D, 38 notifications of patients removing from one place to another were received from Superintendents of Workhouses, and Relieving Officers. Of these 37 were notifications of patients leaving the Workhouse to come to town, and under this heading there were three duplicate notifications.

Referring to Tables III. and IV. of Section II. there are given the number of cases notified and the number of deaths which occurred in each Ward ; also the seasonal incidence mortality, which is fairly evenly distributed throughout the year ; whereas usually the heaviest incidence is during the months of Spring.

From Table IV. it will be observed that during the month of January, 1909, when the Public Health (Tuberculosis) Order came into operation, there were 45 notifications. Nearly the whole of these were Poor Law cases, notified either from the Workhouse or Common Lodging Houses.

In Table XII. is set forth certain particulars regarding the cases notified during the year 1909. In the first column the cases notified are re-stated in regard to sex, size of house, and how notified. Only 11 cases were notified voluntarily, while 96 were notified compulsorily, of which 65 were males and 42 were females. Of the 96 cases notified compulsorily 40 or 41·7 per cent. had no fixed residence, being notified as residents of common lodging houses ; and on account of the migratory nature of many of these people, it was found that in 24 cases out of the 40, as also in three other cases, the life histories could not be traced.

Chief Sources of Infection—The Bacillus Tuberculosis, the Causal Micro-organism.

Early recognition of the Disease and its Infectivity.

Some of the illustrious Fathers of Medicine, such as Hippocrates and Galen, who lived from 460-357B.C., and 130-200A.D. respectively, observed and believed that phthisis was an infectious disease, and their observations were frequently confirmed by many of the older physicians. The scientific proof of this earlier conception, however, was not confirmed until 1882, when Koch, pursuing the methods of experimental inoculation of animals, first practised by Villemin, announced to the world his discovery of the pathogenic microbe of tuberculosis, of which Pulmonary Tuberculosis or Phthisis, or Consumption, is a fairly well defined division. Further investigation has shown that there exists two types of this bacillus—the Bacillus Humanus and the Bacillus Bovinus ; the former is the typical bacillus found present in cases of phthisis in adults, while the latter is more frequently found present in cases of tuberculosis in children, and always present in cases of bovine Tuberculosis Consequently, this disease cannot arise *de novo*, neither hereditary nor environmental conditions are sufficient, although they increase susceptibility ; before infection can take place the causal bacillus must find an entrance into the human body. Therefore, phthisis, or consumption, must be considered a specific or microbal infectious and contagious disease.

Pathways of Infection.

Infection may take place by inhalation ; or by ingestion or swallowing ; or by inoculation. This last mode is rare, and will not be referred to further.

In recent years there has been a great and interesting controversy as to the relative frequency of infection by Inhalation *versus* Ingestion, and especially in relation to different age periods. This whole question, including the more important experimental work and views of the different schools, has been discussed at considerable length in my Report on Dairies, Cowsheds and Milk Supplies, which forms the appendix to this report. Consequently, I will only here state that although we now recognise the possibility of frequent infection of infants and young children through the ingestion of tuberculous milk and food, there still remains preponderating evidence that in the case of adults the most common source of infection is by inhalation.

This, then, leads to the important question of how and when and from where are these causal and pathogenic bacilli disseminated in space so as to become an almost omnipresent source of danger to every one who breathes.

The Infective Population.

As every phthisical patient, when the disease is progressing, will probably at certain clinical stages be more or less a source of infection, it is interesting to enquire as to the probable extent of the infective population. It has been variously computed on the commonly accepted supposition, that for every annual death from phthisis in any community there are from 3 to 10 infective persons present in the general population. Then, taking the last census population of England and Wales for 1901, this gives the proportion of one phthisical person to every 263 persons ; or one to every 79 persons on the 3 and 10 basis respectively. Fuller investigation and the weight of evidence tend to prove that even the figure 10 is well within the mark ; and there are some who have had extensive observational and clinical experience, who think that even 10 doubled is nearer the truth—that there are 20 infective persons in the general population to every annual death.

TABLE XII.

PHTHISIS.—Particulars of Cases Notified during the Year 1909.

SIZE OF HOUSE	No. of Notifications		Ages					Type of House						Particulars Regarding House											Treatment			Occupation		Means' of Family or Patient				Habits			Sleeping Accommodation		
										Not Through				Cleanness			Light		Sunshine		Means of Ventilation																	Joint Bedroom	
No. of Rooms	Male	Female	Under 5 yrs.	5-15 yrs.	15-25 yrs.	25-65 yrs.	65 yrs. & over	Back-to-Back	Through	No back door or windows	But windows at back	No. Damp.	Average Rent	Clean	Fairly Clean	Dirty	Sufficient	Insufficient	Good	Fair	Sufficient	Insufficient	Properly Used	Neglected	Hospital	At Home	Both	Outdoor	Indoor	Good	Fair	Poor	Cases having Poor Law Relief	Good	Indifferent	Bad	Separate Bedroom	Separate Bed	Joint Bed
1 Room—Comp. Notification ...	1	...	...	...	...	1	...	1	...	...	...	1	1/6	...	1	...	...	1	...	1	...	1	...	1	1	...	...	...	1	...	...	1	1	...	1	...	1	...	...
2 Room { Comp. ,, ...	11	17	1	...	2	23	2	24	1	1	2	22	2/10	4	14	10	5	23	4	24	1	27	6	22	2	10	16	2	26	...	...	28	17	2	15	11	2	2	24
	...	3	...	...	...	3	Not	Traced.																															
{ Vol. ,, ...	...	2	...	...	1	1	...	2	...	...	...	...	...	2	...	...	...	2	...	2	...	2	...	2	...	2	...	...	2	...	...	2	1	1	1	...	...	...	2
3 Room—Comp. ,, ...	2	4	...	2	...	4	...	5	1	...	...	4	3/8	1	3	2	...	6	...	6	2	4	1	5	1	1	4	2	4	...	...	6	3	2	4	...	...	2	4
4 Room { Comp. ,, ...	10	7	...	1	3	13	...	6	10	1	...	9	4/5	3	9	5	8	9	6	11	10	7	5	12	5	5	7	3	14	...	...	17	6	2	8	7	2	4	11
{ Vol. ,, ...	3	1	...	...	1	3	...	...	4	...	...	1	...	3	...	1	4	...	3	1	4	...	2	2	...	4	...	2	2	...	2	2	...	2	1	1	1	2	1
5 Room { Comp. ,, ...	1	...	...	...	...	1	...	...	1	...	...	1	5/5	...	1	...	...	1	...	1	...	1	1	...	...	...	1	1	...	...	...	1	1	...	...	1	...	1	...
{ Vol. ,, ...	1	3	...	...	2	1	1	...	4	...	...	...	...	3	1	...	3	1	3	1	4	...	3	1	...	3	1	1	3	1	3	...	...	2	1	1	...	2	2
6 Rooms & Over—Vol. Not.	...	1	...	...	...	1	...	...	1	...	...	...	6/6	1	...	...	1	...	1	...	1	...	1	...	...	1	...	...	1	...	1	...	...	1	...	...	1	...	...
Common Lodging Houses— Comp. Notification ...	14	2	...	...	...	15	1	...	10	...	...	8	...	...	9	1	3	7	3	7	6	4	5	5	6	...	10	4	12	...	...	16	3	...	2	14	...	15	1
,, ,, ...	22	2	...	...	...	23	1	Not	Traced.																														
Totals —Vol. Notification	4	7	...	...	4	6	1	2	9	...	...	1	...	9	1	1	8	3	7	4	9	2	6	5	...	10	1	3	8	1	6	4	1	6	3	2	2	4	5
—Comp. ,, ...	61	35	1	3	5	83	4	36	23	2	2	45	...	8	37	18	16	47	13	50	19	44	18	45	15	16	38	12	57	...	...	69	31	6	30	33	5	24	40
ALL HOUSES—Totals	65	42	1	3	9	89	5	38	32	2	2	46	...	17	38	19	24	50	20	54	28	46	24	50	15	26	39	15	65	1	6	73	32	12	33	35	7	28	45

Applying this argument then to the Borough of Rochdale, with its estimated population of 89,654, and 97 deaths from phthisis during the past year, there would be 291, 970 or 1,940 infective persons present in this town according as we accept 3, 10, or 20 as representing the basis of calculation. From my own experience, as also that derived from domiciliary visitation, I am of opinion that 10 is the approximate to the truth, and on this basis the proportion of consumptives in the general population of this town would be one in every 93 persons, or roughly one in every 100. This computation excludes all those—probably about 50 per cent. of the entire population—who exhibit post mortem evidences of more or less healed tubercular lesions.

In all these cases the Tubercle Bacillus, although gaining a footing in some organ, as in the lung, was ultimately destroyed, or at least so walled in by a barrier of defensive tissue as to be rendered innocuous ; and such individuals were never at any time discharging tubercular sputa, and consequently were never infectious to others.

The Tubercle Bacillus and some considerations regarding expectoration from the public health point of view.

The Bacilli, when detected, are usually present in the sputum, and especially during the last stages of the illness, when expectoration becomes profuse, but they may also be found in the urine, fæces and blood, and have been isolated from the milk secretion in females.

As a general rule it may be said that, although the presence and pathogenicity of the bacilli are not always synonymous with the quantity of expectoration, yet the possibilities and danger of infection varies roughly with the amount of expectoration, and consequently one often finds, especially in the homes of the poorer classes, that the danger of infection increases in proportion to the frequency of expectoration. For in such homes are to be found the greatest number of advanced cases, where the patient, either through carelessness, or ignorance, or both, or through feebleness and want of nursing, no hygienic precautions are or can be adopted for the disposal of the sputum.

That the sputa of phthisical patients is a prolific source of infection may be dimly contemplated, when we consider that the daily sputa of a single patient has been estimated to contain the enormous number of over 7,000,000,000 bacilli, and that a single small pellet of expectoration may contain no less than 3,000,000 bacilli. But, fortunately, all the bacilli of this vast army are neither actively nor potentially dangerous, some will undoubtedly be already disabled or have succumbed in their combat with the living tissues, or through the accumulation of their own toxines and otherwise.

Although, as already estimated, that there is probably one infective person to every 100 persons, yet there are some conditions which tend to limit the spread of infection. Every phthisical patient is not infectious ; and no phthisical patient is infectious throughout the whole period of illness ; while patients differ greatly amongst themselves as regards degrees of infectivity according to their habits. Careful patients do not endanger those with whom they live in the home or with whom they work in the factory or workshop : as Cornet remarks, the consumptive in himself is almost harmless, and only becomes harmful through bad habits.

Many such patients have no expectoration during a large part of their illness and are probably non-infectious. Others again who swallow their expectoration, as is usually done by children and lunatics, are also comparatively harmless, although in these cases the excreta may be infectious and requires to be properly treated. There are some other cases in which the clinical symptoms are well marked ; and although repeated examination fails to detect the tubercle bacillus in the sputum, this does not always prove its absence ; while there remains a few patients who have little or no sputum during the whole of their illness ; and both these types are probably not a serious source of infection.

Still, as the sputa of phthisical patients is the chief bacilli-bearing medium, and when one contemplates how such sputa is deposited indiscriminately in many cases, anywhere or everywhere in living rooms, offices, on the floors of railway carriages and tramway cars, factories and workshops, streets, street corners, etc., it is of importance to enquire into the after history of the bacilli-bearing sputa of such patients.

Wet Sputa.

In wet sputa its physical characters, especially viscidity, are such as to keep the bacilli as safely imprisoned as if in a bottle, and no infection can arise therefrom except by direct contact or indirectly by the infecting of food and milk through the agency of the hands or by flies. Hence, by using a proper bottle spittoon and avoiding the dissemination of any cough spray when expectorating the phthisical patient can render himself comparatively harmless.

The length of time during which virulent bacilli can retain their vitality and powers of infection outside the body have been made the subject of much experimental work. It depends on many factors. The bacilli in wet sputa are readily destroyed by both physical and chemical agents as heat and disinfectants—an exposure of less than a minute in 5 per cent. carbolic acid kills them. But more important is the simple fact, that when exposed in thin layers to direct sunlight they are killed in a few minutes, or in a few hours if in thicker layers, while diffuse sunlight may require a few days. Accordingly, the life of the bacilli will be shorter in all open places, where the street, the home, or the workshop have been so planned as not to obstruct but to be as far as possible freely exposed to the sunlight of heaven, which is the most powerful, the most universal, and the most economic of all disinfectants.

It follows that indiscriminate expectoration is much more dangerous in overcrowded, ill-lighted and ill-ventilated houses than in streets and in public open places. In the latter, through the action of the rays of the sun, combined with efficient cleansing by road or street watering, or it may be by rain water, the bacilli will have a comparatively short existence ; whereas, in the former case, in proportion as the conditions are bad and insanitary the more prolonged will be the presence of living virulent bacilli of consumption which flourish in the filth and darkness. Here much of the sputa passes on to the stage of drying, when the bacilli become air-borne and disseminated in fine dust.

Dried Sputa.

Phthisical sputa, when completely dried, differs from wet sputa very considerably, inasmuch as it can resist a temperature of 100°C. for an hour, while in the moist condition a temperature of 70°C. for one hour is fatal. Consequently, in the former condition, it may contain virulent bacilli for many months, and in such a condition as opportunity arises to become actively and dangerously infective.

It is only when one contemplates such facts as these that the dangers of indiscriminate spitting arise in one's mind. When the bacilli-laden sputa becomes dried, then the bacilli become air-borne in fine dust and disseminated in space by every breeze that blows. This is undoubtedly one of the most frequent sources of infection in homes inhabited by phthisical persons, in factories and workshops, public conveyances, and to a less extent in public places. For it is difficult under such conditions to conceive of anyone who can escape frequently inhaling air-borne tubercle bacilli; and just as the air-borne dust from phthisical sputa can set up active Tuberculosis when experimentally inhaled by animals ; so, likewise, when inhaled by human beings virulent bacilli, if present, may at one time or another, especially if the vital resistance is low, gain an entrance somewhere into the human body, and set up varying degrees of Tuberculosis, which under favourable conditions may end in recovery, or proceed to run its course to ultimate death.

The Infectivity and Tenacity of dried dust in Houses.

The extent to which not only the bacilli are found in the air and dust of rooms inhabited by phthisical patients, but also to show the tenacity with which the dust and bacilli adhere to the walls and everything else, has been the subject of much experimental work. One of the recent investigations was carried out by Dr. Coates, under the direction of Professor Delepine of Manchester, who confirmed much of the earlier work by Cornet and others.

The houses were divided into three classes :—

I.—Houses Dirty.—In which the patient took no precautions as to the disposal of his sputum, but expectorated indiscriminately on floor, handkerchief, etc.

II. Houses Very Clean.—But still where the patient does not take sufficient precaution regarding the disposal of his sputum.

III. Houses Very Dirty.—But in which there has been no case of phthisis for some years.

Samples of dust were collected in the three types of house from walls, ceilings, mantlepieces, shelves, etc., from such situations as dust had settled naturally from the air in the rooms.

In I. and II. respectively 66·6 per cent. and 50 per cent. of the houses contained active and virulent bacilli which were capable of setting up active Tuberculosis when inoculated into the bodies of animals. From this result it was concluded that ordinary household cleanliness is not sufficient to prevent the accumulation of infective material in rooms occupied by phthisical patients.

In III. no bacilli were found. From this again it was concluded that the virulent bacilli present in houses I. and II. were due to the presence of the phthisical patients, and as a corollary that the Tubercle bacillus is not likely to be present in any house except due to a consumptive patient.

Endemic Areas.

Some argue further and produce some statistics which go to prove that Tubercular infection may attach itself to particular small areas or even to houses or rooms—" Tuberculous infective areas."

Such endemic areas nearly always co-exist with slum areas, where all predisposing conditions are found in greatest intensity, and I am of opinion that the environmental conditions are more important in predisposing the inhabitants and consequently perpetuating Tuberculosis in any area than to suppose the interminable vitality, or exalted virulence of the bacilli in any such areas.

Cornet, who closely investigated this subject, was of opinion that if left alone infective material usually disappeared from an ordinary house after about six months freedom from infection, and at the present day, when thorough disinfection can be carried out, there is no reason why a house should not be rendered free from infection at once.

Recurrence of Disease in Certain Houses.

However, without any special investigation, but bearing on this subject, it is within the knowledge of the Health Visitors that during the past six years there are 14 houses in each of which two deaths have occurred at different periods and in which eight other cases have been notified. In like manner, and during the same period, in two houses three deaths have occurred at different periods, and in three other houses there have been seven notifications and two deaths. Further, in Wardleworth East Ward, in Census District 14, there is a small area under consideration, which contains a block of six houses—four back-to-back and two through. In this block there have been eight deaths and two cases notified during the past five years. In this Census District the average Phthisis, Respiratory and Zymotic death-rates for the past eight years are 2·60, 5·19, and 3·09 respectively, while the corresponding rates for the Borough are 1·38, 3·41, and 1·64.

Relative Importance of some sources of Infection.

Having discussed some aspects of the sources of infection as regards expectoration and infection arising from wet and dried sputa, it becomes a matter of very great importance for the guidance of one's daily social and domestic conduct to have some definite knowledge regarding the relatively more important and dangerous sources of infection so as to know how to avoid them ; and this applies more directly to those who are associated with phthisical patients, either in the office, workshop, or associated with, or nursing such patients in the home or in the hospital.

In recent years a very interesting and instructive discussion, accompanied by much valuable experimental work has been carried on by many eminent investigators ; and of these the work of Villemin, Koch, Flügge, Cornet and Heymann is very instructive and of real practical and administrative value. On one thing nearly all are agreed, that phthisis or consumption in the adult is chiefly caused by inhalation of infective matter, which has been ejected in the process of coughing, sneezing, speaking, shouting, etc., or in expectorating, by some previously infected person, and which may be inhaled either in the wet form as a fine spray, or when it becomes dried dust and air-borne. Also, although it has been frequently affirmed by many that the air expired by phthisical patients has been shown to contain tubercle bacilli ; all are now persuaded through the experimental work of Tyndall that in quiet ordinary breathing the expired air of such patients is absolutely sterile.

To Villemin, nearly 50 years ago, is due the credit of first recognising the fertile source of infection from dried sputa.

Koch, following in the wake of Villemin, recognised the importance of both theories as prolific sources of infection ; and although much of his experimental work was on spray infection—proving its possibilities and effectiveness ; yet he considered that infection through the inhalation of air-borne infective matter must be a much more prolific source, when due regard is had to the ignorance, indifference and negligence so often displayed as regards indiscriminate expectoration and its opportunities, especially in homes, offices and works, to become dried, pulverised, and air-borne, through the heated air and commotion of individuals in their daily operations ; while spray infection was more limited in its scope and almost confined to contact infection, facilities for which on the other hand are especially present in domestic life and in those closely associated together.

Flügge, on the other hand, based on his own experimental work and observations, comes to the conclusion that, although infection from dried dust is quite possible, it seldom happens, because the conditions seldom occur for the sputum to become sufficiently dried and pulverised so as to be suitable for aerial convection. He supports the spray theory, and shows how readily it may take place within a radius of about three to five feet to a phthisical patient, while coughing, sneezing, expectorating, etc.

Amongst the most recent investigators is Heymann, who has carried out a series of experiments which are very convincing in their results and in general agreement with Koch. He proves that infective matter is not ejected more than three to five feet from a phthisical patient, and as a corollary it follows that the infective area is chiefly within this zone ; and he has also proved that the ejected droplets or particulate matter are such as quickly obey the laws of gravity, and in less than half-an-hour after ejection the great majority will have fallen to the floor.

Heymann's conclusion, like Koch's, are based on solid experiment and deserve serious consideration. He considers that dried dust and wet spray infection are equally important in themselves in producing Tuberculosis in experimental animals and probably so in man, but that the one form or the other may become the more important and a more active source of infection according to circumstances. In the ordinary circumstances and conditions of life he is of opinion that spray infection will be chiefly operative in circumstances of closest intimacy, and such as may exist between married people, mother and children, nurses of the sick, and in domestic life generally. On the other hand he recognises that in all circumstances and conditions of life, where we have many human beings crowded together as in theatres, music halls, and places of amusement, and frequently in railway carriages, tram cars, shops, offices, and industrial workshops generally, where indiscriminate expectoration is permitted and a heated atmosphere, the infection from virulent dust arising from the dried and pulverised sputa through the continuous agitation of the atmosphere, must be a very serious source of infection to those who live in and breathe such an atmosphere.

Heymann, Cornet, and others have also shown that just as the droplets or particles of fine spray ejected in coughing, are such as usually fall to the floor in about 30 minutes ; so likewise the period of suspension of dried and pulverised sputa dust, such as may be given off in the home in dusting, carpet sweeping and beating, is also short and usually about 10-15 minutes in a quiet atmosphere. There are other sources of infection equally important, but opportunities for which to occur are less frequent.

Infection by Soiled Hands.

It is evident that this source of infection must vary in proportion to the cleanly or uncleanly habits of phthisical patients, who, if of the latter type, then there is every opportunity for hands and fingers, clothes, etc., to become infected during expectoration and coughing, or in handling spittoons, handkerchiefs, etc. Then as such patients may be expected to be equally indifferent as to the washing of the hands; other household utensils, and especially food and milk, may very readily become infected and thereby a medium of transmission of the disease to others.

Infection by Saliva (as in kissing and using the same drinking cups, spoons, etc.).

On this subject there has been considerable divergence of opinion, not only in the scientific but also in the popular mind. But it may be now accepted as proved that, although the saliva in a phthisical patient is ordinarily germ-free, yet in coughing they are frequently present in the saliva of the mouth and consequently may at times be a real source of infection through any of the above mentioned media, and more especially in the case of children who are more susceptible to infection than adults.

Infection by the Agency of Flies.

Probably no subject affecting public health has been in recent years more fully investigated than the role played by flies as carriers of disease. This they do chiefly by infecting food and milk with infective material, adhering to and carried by their feet and bodies after feeding or coming in contact with some source of infection. Further, Spillmann and Hausmann, in a series of experiments, which have been frequently confirmed by others, found tubercle bacilli in the abdominal cavity and fæces of flies which had fed on tuberculous sputa and also on the sputa adhering to the clothes of consumptive patients.

Excremental Discharges from the bowel and bladder.

The fæces may become infective in two conditions; when the bowel itself is tubercular, as in tubercular enteritis and peritonitis, or when tuberculous expectoration is swallowed—conditions frequently present in tubercular children. Further, in renal tubercular disease the urine frequently contains tubercle bacilli.

Investigation of Cases Notified.

During the year every case notified and in every case of death from phthisis a visit has been at once made by the Lady Health Visitors or Sanitary Inspectors, or both; the life history of every case, when obtainable, was carefully and very fully investigated in order as far as possible to analyse the possibilities of the source of infection. Many cases, however, baffled investigation, especially those notified from Workhouses and Common Lodging Houses. Such patients, through leading a migratory life, have often no fixed abode, but on admission, when asked, give some remote or fictitious address, which is the cause of much annoyance and waste of time to the Health Visitors and Inspectors. The Inspectors carried cards on which about fifty items of information had to be filled in. What information was not obtained on first visits was as completely as possible ascertained on subsequent visits by various diplomatic, sympathetic, and tactful ways. Then as no one is so interested in ones own illness as ones self, the patient and their relatives were invited in every case to state freely and frankly what they considered to be the supposed cause, as such interrogation often suggests or opens up other lines of enquiry which may lead more directly to the truth. These are stated in the subjoined Table XIII.

TABLE XIII.

Snpposed Cause of Phthisis (according to Patients and Relatives).

Supposed Cause	Notified living cases	Death cases
Domestic Infection	10	12
Dust at Work	5	10
Want of Food and Poverty	19	3
Bad Habits and Drink	28	3
Weakness from Birth	9	4
Over Work	3	...
No Cause known	4	6
No information obtainable	29	35
Weakness after Pneumonia	...	15
Weakness after Broken Thigh	...	1
Tubercular Appendicitis	...	1
Influenza and Colds	...	7

These causes are stated in the terms used by the patients or their relatives, and it has to be added that the further investigation frequently confirmed their approximate truth.

The greater incidence of Disease and Mortality falls on Males.

In referring to Tables XII. and XIV. it will be seen that the incidence of notification and mortality falls far heavier on the males than females—23 more males were notified and 23 more died. Males suffer a higher phthisis mortality than females at every age period except between 5 and 25 years. This is to be accounted for not so much by any influence of sex, nor by any degree of variation in natural susceptibility, but rather by differences in habits, occupation and surroundings. Women live more moderate and temperate lives. Their chief duties are at home, or if employed industrially, their work does not always involve the same risks as those of men. But even more important are certain marked differences in the habits of men and women. Women are more cleanly in their habits. They do not expectorate, neither at home nor at work, as men do. Nor do they resort to the same extent to Common Lodging Houses, where often men are herded together; nor do they frequent public houses and haunts of revelry where men sit and drink and expectorate. Further, some trades in which men are mostly engaged have a tendency to induce phthisis, and especially those which are carried on in an atmosphere of mineral or organic dust particles which tend to irritate the lungs; or in overcrowded, damp and ill-lighted or ill-ventilated workrooms; or which expose the workers to sudden alternations of heat and cold; and further men make up the ranks of the casual labourer, the unemployed and the unemployables, who through debilitated conditions are very susceptible and succumb readily to tuberculosis.

TABLE XIV.

Distribution of Phthisis Deaths during Year 1909.

SIZE OF HOUSE	No. of Deaths		Ages					Type of House					
No. of Rooms.	Male	Female	Under 5 yrs.	5-15 years	15-25 years	25-65 years	65 yrs. & over	Back-to-Back	Through	Not Through, no back door or window	Not Through, but window at back	No Damp	Average Rent
Deaths among Notified Cases—During 1909													
One Roomed…………	1	…	…	…	…	1	…	1	…	…	…	1	1/6
Two ,, …………	3	6	…	…	1	7	1	8	…	…	1	9	2/11
Three ,, …………	…	…	…	…	…	…	…	…	…	…	…	…	…
Four ,, …………	5	4	…	…	1	8	…	3	6	…	…	2	4/8
Five ,, …………	1	2	…	…	1	1	1	…	3	…	…	…	5/9
Six Roomed and over	…	…	…	…	…	…	…	…	…	…	…	…	…
Common Lodging Houses ……………	10	2	…	…	…	11	1	…	7	…	…	7	…
Total………	20	14	…	…	3	28	3	12	16	…	1	19	…
Deaths of Non-Notified Cases —													
Two Roomed ………	2	4	…	…	1	5	…	6	…	…	…	4	2/11
Three ,, …………	…	1	…	1	…	…	…	1	…	…	…	…	3/6
Four ,, …………	25	17	2	2	6	28	4	1	40	1	…	11	4/8
Five ,, …………	6	…	…	…	1	5	…	…	6	…	…	1	6/3
Six Roomed and over	6	1	…	…	…	6	1	…	7	…	…	2	…
Common Lodging Houses ……………	1	…	…	1	…	…	…	…	1	…	…	…	…
Total………	40	23	2	4	8	44	5	8	54	1	…	18	…
Grand Total …………	60	37	2	4	11	72	8	20	70	1	1	37	…

SIZE OF HOUSE	Particulars Regarding House											Treatment		
	Cleanness			Light		Sunshine		Means of Ventilation						
No. of Rooms.	Clean	Fairly Clean	Dirty	Sufficient	Insufficient	Good	Fair	Sufficient	Insufficient	Properly used	Neglected	Hospital	At Home	Both
Deaths among Notified Cases—During 1909														
One Roomed…………	…	1	…	…	1	…	1	…	1	…	1	1	…	…
Two ,, …………	2	5	2	1	8	…	9	…	9	…	9	…	8	1
Three ,, …………	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Four ,, …………	6	1	2	4	5	4	5	6	3	3	6	…	6	3
Five ,, …………	2	1	…	2	1	2	1	3	…	1	2	…	2	1
Six Roomed and over	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Common Lodging Houses ……………	…	5	2	2	5	…	7	5	2	4	3	12	…	…
Total………	10	13	6	9	20	6	23	14	15	8	21	13	16	5
Deaths of Non-Notified Cases —														
Two Roomed ………	2	3	1	2	4	2	4	…	6	4	2	1	5	…
Three ,, …………	1	…	…	…	1	1	…	…	1	1	…	…	1	…
Four ,, …………	35	4	3	39	3	30	12	33	9	31	11	3	35	4
Five ,, …………	5	1	…	6	…	5	1	6	…	6	…	…	5	1
Six Roomed and over	6	1	…	6	1	6	1	7	…	6	1	…	7	…
Common Lodging Houses ……………	…	1	…	1	…	1	…	1	…	1	…	…	1	…
Total………	49	10	4	54	9	45	18	47	16	49	14	4	54	5
Grand Total …………	59	23	10	63	29	51	41	61	31	57	35	17	70	10

SIZE OF HOUSE	Means of Family or Patient			Occupation		Cases having Poor Law Relief	Habits			Sleeping Accomodation		
											Joint Bedroom	
No. of Rooms.	Good	Fair	Poor	Out-door	In-door		Good	Indifferent	Bad	Separate Bedroom	Separate Bed	Joint-Bed
Deaths among Notified Cases—During 1909												
One Roomed…………	…	…	1	…	1	1	…	1	…	1	…	…
Two ,, …………	…	…	9	1	8	7	2	4	3	…	…	9
Three ,, …………	…	…	…	…	…	…	…	…	…	…	…	…
Four ,, …………	…	2	7	2	7	3	1	3	5	…	5	4
Five ,, …………	1	2	…	1	2	…	2	…	1	…	2	1
Six Roomed and over	…	…	…	…	…	…	…	…	…	…	…	…
Common Lodging Houses ……………	…	…	12	8	4	5	…	4	8	…	10	2
Total………	1	4	29	12	22	16	5	12	17	1	17	16
Deaths of Non-Notified Cases —												
Two Roomed ………	…	…	6	…	6	3	2	4	…	…	2	4
Three ,, …………	…	…	1	…	1	…	1	…	…	…	1	…
Four ,, …………	7	17	18	7	35	…	28	11	3	12	6	24
Five ,, …………	2	4	…	1	5	…	4	1	1	2	1	3
Six Roomed and over	3	4	…	3	4	…	4	3	…	2	2	3
Common Lodging Houses ……………	…	…	1	…	1	…	1	…	…	…	1	…
Total………	12	25	26	11	52	3	40	19	4	16	13	34
Grand Total …………	13	29	55	23	74	19	45	31	21	17	30	50

SIZE OF HOUSE	Number of Deaths in each Ward of the Borough										
No. of Rooms.	Castleton North	Castleton South	Castleton East	Castleton West	Castleton Moor	Spotland East	Spotland West	Wardleworth East	Wardleworth West	Wardleworth South	Wuerdle
Deaths among Notified Cases—During 1909											
One Roomed…………	…	…	…	…	…	…	…	…	1	…	…
Two ,, …………	1	1	…	…	…	…	1	1	…	3	2
Three ,, …………	…	…	…	…	…	…	…	…	…	…	…
Four ,, …………	…	…	…	…	1	1	…	2	1	4	…
Five ,, …………	…	…	…	…	1	…	1	…	1	…	…
Six Roomed and over	…	…	…	…	…	…	…	…	…	…	…
Common Lodging Houses ……………	6	…	…	1	…	1	…	2	1	1	…
Total………	7	1	…	1	2	2	2	5	4	8	2
Deaths of Non-Notified Cases —											
Two Roomed ………	1	…	1	…	…	1	…	1	…	1	1
Three ,, …………	…	1	…	…	…	…	…	…	…	…	…
Four ,, …………	1	7	8	6	2	5	1	2	4	2	4
Five ,, …………	…	2	…	…	2	…	1	…	…	1	…
Six Roomed and over	…	1	…	2	…	…	…	…	2	2	…
Common Lodging Houses ……………	…	…	…	…	…	…	…	1	…	…	…
Total………	2	11	9	8	4	6	2	4	6	6	5
Grand Total …………	9	12	9	9	6	8	4	9	10	14	7
Rates per 1,000 of Estimated Population ……………	1.33	1.09	0.81	1.20	0.73	1.08	0.46	1.48	1.48	1.60	0.97

Occupational Influences.

Table XV. gives a summary of the occupations of 80 of the 107 notified cases, leaving 27 who followed no definite occupation and who were notified from Common Lodging Houses.

The nature of the work of the majority in this Table is more or less indoor, and the proportion of indoor to outdoor workers amongst all notified cases is given 65 to 15 (Table XII.)

TABLE XV.

PHTHISIS, 1909.

Particulars of Occupation of Cases Notified, and proportion of Deaths of Cases Notified to Cases Un-notified.

OCCUPATION	CASES NOTIFIED							DEATHS				Total Deaths Registered	
	Voluntary		Compulsory		Total			Of Cases Notified*		Of Cases Not notified			
	M.	F.	M.	F.	M.	F.	Total	M.	F.	M.	F.	M.	F.
Factory Operatives	1	3	8	15	9	18	27	2	4	10	7	12	11
Labourers (General)	2	...	20	...	22	...	22	12	...	3	...	15	...
Warehousemen	...	...	4	1	4	1	5	2	...	...	1	2	1
Home Duties	...	3	...	8	...	11	11	...	5	...	9	...	14
Charing	...	...	...	5	...	5	5	...	4	...	1	...	5
Iron Workers	...	...	2	...	2	...	2	...	...	5	...	5	...
Hawkers	...	...	1	...	1	...	1	1	...	1	1	2	1
Heald Knitter	...	1	...	...	...	1	1	...	1	...	...	...	1
Carter	...	...	1	...	1	...	1	...	...	...	...	...	...
Tailor	...	...	1	...	1	...	1	1	...	...	...	1	...
Sugar Boiler	...	...	1	...	1	...	1	...	...	...	...	...	...
Tripe Dresser	...	...	1	...	1	...	1	...	...	...	...	...	...
Insurance Agent	1	...	...	...	1	...	1	1	...	...	...	1	...
Shopkeepers	...	...	...	...	...	...	...	...	...	1	1	1	1
Painters	...	...	...	...	...	...	...	...	...	2	...	2	...
Travellers	...	...	...	...	...	...	...	...	...	2	...	2	...
Cab Drivers	...	...	...	...	...	...	...	1	...	1	...	2	...
Laundry Manager	...	...	...	...	...	...	...	...	...	1	...	1	...
Dressmaker	...	...	...	...	...	...	...	...	...	...	1	...	1
Joiner	...	...	...	...	...	...	...	...	...	1	...	1	...
Engineer	...	...	...	...	...	...	...	...	...	1	...	1	...
Stonemason	...	...	...	...	...	...	...	...	...	1	...	1	...
Beer Seller	...	...	...	...	...	...	...	...	...	1	...	1	...
Pavior	...	...	...	...	...	...	...	...	...	1	...	1	...
Butcher	...	...	...	...	...	...	...	...	...	1	...	1	...
Corn Miller	...	...	...	...	...	...	...	...	...	1	...	1	...
Dental Mechanic	...	...	...	...	...	...	...	...	...	1	...	1	...
Baker	...	...	...	...	...	...	...	...	...	...	1	...	1
Passenger Guard	...	...	...	...	...	...	...	...	...	1	...	1	...
School Children	...	...	...	...	...	...	...	...	...	1	1	1	1
Infants	...	...	...	1	...	1	1	...	...	2	...	2	...
No Occupation or Retired	...	...	...	...	...	...	...	...	...	2	...	2	...
TOTALS	4	7	39	30	43	37	80	20	14	40	23	60	37
Cases which cannot be traced—Chiefly from Common Lodging Houses	...	...	22	5	22	5	27	...	...	...	...	...	...
TOTALS	4	7	61	35	65	42	107	20	14	40	23	60	37

* Instead of a total of 34 deaths under this heading there were 40 deaths, but in six so notified the death was registered as due to another cause.

That occupation in so far as it allows of indoor or outdoor life influences or predisposes to phthisis there is ample evidence ; and many illustrations are provided amongst the lower animals. The monkey in captivity and the milch cow stalled for the greater part of the year are both very susceptible to tuberculosis ; whereas the monkey in the forest and the sheep on the mountain rarely if ever suffer from this disease.

Considering the chief industrial occupations there are three well-marked groups in which the comparative mortality is always highest :—(1) Those occupations in which the workers are exposed to irritating and injurious dust as tin miners, file-makers and cutlers ; (2) General and casual labourers, porters and costermongers ; (3) Inn and hotel servants. In (2) and (3), however, alcoholic excess with its debilitating influence and greater exposure to infection are probably more potent than the industrial factor. On the other hand, occupations in which the comparative mortality is lowest are farmers, gardeners, clergymen and teachers. Thus, allowing for the different numbers engaged as well as sex and age distribution in the different occupations, for every one farmer who dies there are three or four who die in either of the groups (1), (2) and (3).

Regarding the great cotton and woollen industries in this and other Lancashire towns, they occupy an intermediate position, and such occupations cannot in themselves be termed unhealthy, when carried on under favourable hygienic conditions as in most of the mills in this town. Thus again, for every gardener or clergyman who dies there are nearly two mill operatives or two medical men.

In all the newer cotton and woollen mills in this town every consideration has been given to the hygienic conditions of the operatives. The mills are well lighted and ventilated, and provision made for the prevention of dust and for maintaining the purity of the atmosphere as far as practicable and the processes of manufacture will permit.

The sanitary conveniences are also sufficient and on the fresh water carriage system. On the other hand, in some of the older mills, the sanitary conveniences are often both insufficient and defective ; but these are also gradually being replaced by the fresh water system.

Domestic Infection.

Turning to Table XIV. it will be seen that there were 97 deaths from phthisis during 1909—60 males and 37 females ; and the distribution of these deaths is given under the same headings as in Table XII.

In this Table, however, we have presented separately the deaths from non-notified cases, and the group of deaths amongst cases which were notified during the same year, 1909 ; and it is interesting to note that there were 63 of the former, while only 34 of the latter. These 34 cases are of course included amongst the 107 cases in the Notification Table XII. ; but in many of these, since the conditions found at death were very different to those found on notification, and due often to change of habitation and various depressing economical circumstances, we have again recorded the conditions of each case as found at death.

Regarding domestic infection or direct infection from person to person, although statistics are as yet inconclusive as regards its frequency, there is a growing conviction with most observers that the evidence available indicates its frequent occurrence. It is further interesting to note that many of the patients and their relatives appeared to think it was the most likely cause in no less than 22 cases, and I venture to think that no one who has carefully investigated a series of cases can fail to be impressed otherwise than that there is much truth in their statements.

The following Table XVI. summarises an analysis of some of the cases investigated as to the likely or possible source of infection amongst relatives by personal contact or otherwise in ordinary domestic and home life.

TABLE XVI.

	Likely	Possible	
Husbands Infected by Wives	...	3	Two of the wives have died from phthisis and the interval intervening between death of wife and notification of husband was two and three years respectively. In the other case the wife is suffering from phthisis as also a daughter.
Wives Infected by Husbands	7	4	Four of the husbands have died of phthisis and three others are in the advanced stage, one of whom has just died. One wife notified five months, another two years, and another three years after death of husband.
Brothers Infected by Brothers ...	8	6	These all refer to different families in each of which a brother has previously died of phthisis, and in nearly every case the deceased brother had occupied a joint bed or joint bedroom with the brother now suffering.
Sisters Infected by Sisters............	7	1	These also refer to different families, and in five of which a sister had previously died of phthisis, who in each case was sharing the same bed as the sister now affected, while two sisters now suffering had nursed sisters who died of phthisis.
Brothers Infected by Sisters	...	2	One sister died of phthisis and lived in same house, while one sister when herself suffering from advanced phthisis was nurse to her brother through a long illness.
Sisters Infected by Brothers	1	2	One brother has died from phthisis and the sister who nursed him is now infected. Two brothers have died from phthisis in different families, and in each a sister is now suffering.
Daughters Infected by Fathers......	3	2	Three fathers have died from phthisis and two suffering from phthisis. In three cases they were occupying joint bedrooms with their families and in one case occupied a joint bed. In one case seven slept in one small room. Another case father and three others occupied joint bed, father has since died and the daughter aged three years.

This summary might be considerably extended, but much of the exact information desirable, especially as regards the relation of cases supposed or known to be sources of infection and those infected by such, in their correct chronological sequence as regards order and time is not available, or not sufficiently accurate ; as also the true relation and susceptibility of the infected person to domestic and extra-domestic influences. This applies to some of the cases already considered, but more especially to the following five families concerning whom, although the history is incomplete, one cannot but receive the impression that the possibilities of family infection are so real and terrible that thereby whole families may be swept off the face of the earth.

(1). FAMILY—Mother died of phthisis 22 years ago. There were seven members of the family, four sons and three daughters, all of whom have now died of phthisis at ages from 16 to 38 years.

(2). FAMILY—Parents supposed to have died of phthisis. Family of four brothers and one sister, all of whom have now died from phthisis one after the other.

(3). FAMILY—Both parents died from phthisis. This is followed by the decease of four daughters from phthisis, one by one at various intervals of time.

(4). FAMILY—Both parents died from phthisis followed by their two daughters and one son.

(5). FAMILY—Two parents died from phthisis followed by their two sons, and now one daughter is suffering.

The above Table has been suggested after weighing very carefully all the available evidence in each case ; and although we recognise that its purport is a Table of probabilities, and that in most of the cases cited the evidence appears very convincing, yet we readily admit that the possibilities for infection outside the home are so numerous and often inscrutable, that, even when the home contains an actual source of infection, we cannot always exclude the possibility of the operation of the former extra-domestic infection.

Consequently one can only arrive at the approximate truth by a process of weighing quantitatively and qualitatively the various probabilities, and by a further process of exclusion probably arrive at the most active agent in producing the disease, although others which may have co-operated cannot be entirely excluded.

Latent Tuberculosis.

The difficulty is further increased by the frequently prolonged primary latent period, or the period intervening between exposure to infection and the onset of the illness, which in tuberculosis is usually measured in months or years ; whereas in the other infectious diseases it is short and definite ; and further there is accumulating evidence of prolonged secondary latency in tuberculosis which we are now beginning to recognise in some other infectious diseases.

It has been already stated that probably one half of the post mortem cases show evidences of healed tubercular lesions. But there are others again less fortunate, whose resisting powers have not been sufficient to destroy the intruding bacilli at the seat of infection, nor to erect a wall of impregnable barriers around the bacilli so as to limit their destructive invasion to the original small area of infection. Here the bacilli may remain quiescent or latent for many years, and at some moment when the resisting powers are low, break through the barriers and carried by the blood or lymph to other parts of the same organ or body, may assume their former virulence and pathogenic properties and produce what is termed a fresh attack. In every day language what is termed bleeding from the lungs or Hæmoptysis is an example of the above statement ; so in many cases with feebly healed tubercular lesions the consumptive may be said to sit upon an active volcano. This part of the subject, however, is dealt with more fully in my report on milk-supplies (App.) ; where, in regard to the ingestion theory, evidence is brought forward to show that many who die of Tuberculosis in adolescence or later in life, may have become infected in infancy or childhood with the disease remaining latent during longer or shorter intervals of time. Hence, although in most cases there has to be considered the possibility of recent or causal and protracted domestic and extra-domestic infection, and the possibility that in many cases the initial stages of the disease may have passed unrecognised ; I venture to think that it is reasonable and certainly in accordance with our knowledge of infectious diseases, since for any infection to take place there must be a certain dosage of bacteria which will be facilitated in proportion to the opportunities for transmission from person to person, to suppose that given an actual case of infection in a home the protracted and intimate relationships which must necessarily exist in domestic life readily provide the opportunity for domestic infection ; and whenever such conditions are present, domestic infection will be a more fertile source of infection and a means of disseminating Tuberculosis than any casual or extra-domestic infection.

That this is probably a reasonable conclusion receives further confirmation when we consider that three-fourths of the cases under review in this table were living in two-roomed houses, where the general conditions through want of sufficient bedroom accommodation and consequent over crowding, combined with the absence of any precautionary measures, provided every facility for domestic infection.

Tuberculosis as affected by Housing and Overcrowding.

From the statistical tables of an exhaustive report on the Housing Conditions of this Town which will be submitted later, it will be seen, that on the basis of calculation adopted by the Registrar-General of allowing two persons to each room, the two-roomed houses in this town are overcrowded to the extent of one in every three to four houses, or 28 per cent. ; and in the case of four-roomed houses, one in every 23, or 4·3 per cent.

By referring to Tables XII. and XIV. it will be seen that of the 107 cases notified, after excluding the 27 cases which could not be traced, only seven occupied separate bedrooms, 13 occupied separate beds but in joint bedrooms, while the large number of 44 persons occupied joint beds. There are here to be noted the Common Lodging House cases, where each person usually occupies a separate bed in a large joint bedroom. Of the 97 deaths it will be seen that 17 persons occupied separate bedrooms, while 30 occupied separate beds in joint bedrooms ; and no less than 50 occupied joint beds with others.

Adverting to the chief and relatively more dangerous sources of infection already discussed, and having due regard to the fact that of those suffering from phthisis in this Town during the past year, 94 occupied joint beds, and further that 50 of these were persons who died, and while passing through the final and usually most infective stage by reason of increasing enfeeblement, profuse expectoration and often the lack of hygienic nursing, occupied joint beds with others of a variable number ; we cannot come to any other conclusion than that a considerable number of human beings become infected year by year through such conditions of housing, especially where during the last stages of the disease the dying and infective patient cannot be isolated from the other and often younger and more susceptible members of the household.

Heredity in its relation to Tuberculosis.

In reflecting over Table XVI. there must arise in the minds of many that somewhat obscure and elusive subject, the heredity of Tuberculosis—a subject of social interest to many, but of profound interest and great complexity to the investigator and statistician, When we contemplate how little we know about heredity compared to what we would like to know, even in spite of increasing knowledge, we must consider this subject still *subjudice* ; and I will here only state briefly the undoubted trend of scientific opinion.

In the popular mind phthisis has been in the past and is still by many regarded as a strongly hereditary disease. So strongly did this impress itself on the minds of many of the Fathers of Medicine, that Hippocrates with his great powers of observation and florid imagination delineated the habitus phthisicus, or the conformation of the body of those predisposed as the smooth, the whitish, resembling the lentil ; the reddish, the blue-eyed, and with the scapula or shoulder—bones having the appearance of wings ; and no one will deny that this description is not of accurate application in real life, although we now recognise that these appearances in so far as they exist are due to other causes.

As a further elaboration in descriptive diagnosis two distinct types of conformation have been described ; (1) the " Tuberculous " with bright eyes, oval face, thin skin and long thin bones ; (2) the " Scrofalous," with a heavy figure, thick lips and hands, opaque skin, and large thick bones. Many other differentiations have been made from time to time, but all are now only of historic interest and serve as milestones to mark the stages of transition from the age of imaginative and speculative hypothesis to the age of scientific methods of observation and experiment.

The various theories put forward from time to time to explain the operation of Hereditary influence resolve themselves to two :—(1) By the direct transmission of the germs of disease (in this case the bacillus tuberculosis) from parent to infant before birth ; (2) The transmission or inheritance from parent to off-spring of a special pre-disposition to tubercular infection. Regarding theory (1) many cases have been reported of which about 15 to 20 appear to be authentic, and similar observations have been made by Johne and MacFadyean in calves from tubercular mothers. In these cases the bacillus tuberculosis was discovered in the tissues or bodies of the infants and calves immediately or soon after birth. But the weight of evidence shows that this must be a rare phenomenon, and probably due to some pathological intra-uterine relationship between parent and off-spring. This theory is chiefly associated with the name of Baumgarten, who believed that one may be infected by direct transmission even through two generations. The theory has been frequently applied and made to fit in as an explanation of the prevalence of tuberculosis and the many special forms of tuberculosis of bones and joints in infancy and childhood. This is done on the assumption that the developing tissues of the young, although infected through the parent, yet, may inhibit the growth of the tubercle bacillus, which, then remaining latent until some variable period after birth, but probably measured by the state of nutrition and resisting powers of the child, may become actively virulent and then the child begins to exhibit the signs and symptoms of the disease. It must be said, however, that this theoretical explanation of the early appearance of tuberculosis in children is not supported by any reliable scientific evidence, which on the contrary tends to show that ante-natal or infection before birth, if it occurs at all, must be of rare occurrence ; whereas post-natal infection must be recognised as the chief and great source of infection.

Hereditary Predisposition to tuberculosis or tubercular diathesis are terms just as freely used as they are ill-understood. They are abstract conceptions of an indefinable something, bearing the burden of which some unfortunate human beings are born into this world.

The most prevalent view which covers the generally accepted notion regarding predisposition in the public mind is well expressed by Dr. Williams and quoted by Dr. Newsholme :—

> " Family predisposition has by general consent held a very prominent place, but the value of its influence in the causation of phthisis has been modified of late years by the fuller recognition of other causes which have been to some extent overlooked—such as damp, inflammatory attacks, etc. These and other direct sources of phthisis must exercise in our calculations a depreciatory influence on the amount we assign to hereditary transmission, and numerous cases of this disease which have hitherto been held to originate in a consumptive ancestry, will now be traced to a nearer and more direct cause. Nevertheless, no small number of cases owe their origin to hereditary predisposition, though it is not always easy to demonstrate their hereditary character. Its exact value as a predisposing agent, its mode of transmission, the varieties of the disease in which its influence is most apparent—all these and other points of interest are by no means settled questions, but still open to further inquiry."

The proof of this theory has been frequently attempted by the method of statistics. The general method has been to ascertain in a given or stated number of cases suffering from phthisis what percentage of their ancestors likewise suffered from phthisis. But such statistics, although useful, cannot be regarded as satisfactory or infallible evidence.

To ascertain that 20 or 30 per cent. of any series of investigated cases descended from more or less remote tubercular ancestors, or parents, one or both of which were tubercular, is no proof of hereditary influence. Tuberculosis is a microbal and infectious disease, just in the same sense as we consider Diphtheria and Scarlet Fever ; and if this mode of reasoning is applicable to

Tuberculosis we may just as well argue that cases of the latter diseases are due to heredity, if it can be ascertained that anyone of their ancestors had suffered likewise.

Further, when we keep in view the clinical evidence of hospitals and the evidence of the post mortem room we cannot avoid the conclusion that at least from 30 to 50 per cent. of the general population may be tubercularised ; and consequently with tuberculosis so widely disseminated, although as already stated many never suffer nor show any signs of the disease and may die from some other cause, we must regard any such ascertained percentages as a mere statistical statement which may be even greater or less than the general tubercular population.

The proof of Heredity would be an easy task in the case of any disease which is not infectious, but since it is infectious it would be unreasonable to expect all the cases to be limited to families with hereditary predisposition, even if we were to concede great potency to this cause. There is at present no reliable data to prove that the number of deaths from phthisis amongst those with a tuberculous family history are greater than that which may occur amongst a corresponding number of the general population.

Karl Pearson, in his recent statistical studies on Tuberculosis, has tried to overcome this difficulty and compares the family history and phthisis mortality of any given or random sample of the general population with that of the phthisical section of the community. From such studies he concludes that the tubercular diathesis is inherited. But it has to be added that Pearson only considers his present work as preliminary, as an analysis, by methods still open to criticism, of less than 400 cases provides insufficient data to justify reliable conclusions ; and in any case these methods fail to distinguish between family infection and the inheritance of family predisposition. On this question the following statement by Koch must receive the consideration which its importance demands :—

> " Great importance used to be attached to the hereditary transmission of tuberculosis. Now, however, it has been demonstrated by thorough investigation that, though hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare, and we are at liberty, in considering our practical measures, to leave this form of origination entirely out of account.
>
> Most investigators and the tendency of scientific opinion is to consider tuberculosis in its different forms more in line with other infectious and preventable diseases ; and for purposes of public health administration we may consider the influence of heredity so rare as to be practically neglible ; and consequently that infection nearly always occurs in post-natal life and conditions which are more or less within the scope and jurisdiction of every Health Authority."

Thus while there is strong evidence that the offspring of tuberculous parents neither come into this world with the tubercle bacillus in their bodies in normal conditions nor with any predisposition to infection by the tubercle bacillus, and that without this infection there can be no tuberculosis, yet on the other hand we readily admit that the offspring of tuberculous parents or ancestors may be and often are so organically and functionally weak and so tried by the vicissitudes of growth, that they not infrequently show the delicacy of constitution, incomplete growth and imperfect development, which was recognised by Hippocrates as the habitus phthisicus. Consequently the bodies of such offspring may be said to be predisposed to tuberculosis in this sense, that their bodies are able to offer less resistance when placed in an infectious environment ; and as so often happens in many such cases the risks of infection are multiplied infinitely by contact immediate and continuous in living with infected parents. It is in this sense that the term predisposition is used in the text.

Some further environmental considerations, chiefly as regards Housing Conditions.

Particulars of houses in which patients notified were living and in which deaths occurred are included in Tables XII. and XIV., and the numbers of houses are given as regards conditions of dampness, cleanliness, light, sunshine, means of ventilation, and how used and average rent of houses. These particulars are compiled from the reports of inspection by the Health Visitors and Sanitary Inspectors.

The chief aspects of phthisis discussed up to this point have been the causal bacillus of tuberculosis and the chief sources and means of its dissemination. Now in considering the Housing and all its associated conditions we are introducing the other aspect of the question—environment; and the more we study the conditions controlling the progress of this disease during the past half-century the more are we convinced that great is the power of environment. Koch has stated that phthisis is a disease of dwellings, while some go even further and more pointedly describe it as a bedroom disease.

In my Report on Milk Supplies (App.), I pointed out the analogy between every battlefield, where there is an attacking and a defending party, and every infectious disease where we have likewise the attacking bacillus and the persons defending whose bodies are attacked; and that just as the final issue in the former may be decided by raising the powers of resistance of the defenders, so likewise the decisive battle and final issue between the Bacillus Tuberculosis and the human race may depend more on raising the powers of resistance by improving the environment, than by making direct frontal attacks on the bacillus itself. For, since the bacillus has at most a limited extra-corporeal existence then it must come to pass that just as the resisting powers of any community increase in just the same proportion will the bacillus disappear for lack of susceptible material. Hence, since so much depends on environment and since much of the life history of every individual is concerned in action and reaction to environment, the latter must from the public health point of view be recognised as an all-important and fundamental factor in any well devised and comprehensive scheme which has for its purpose the extirpation of tuberculosis.

Effects of Urbanisation of the People to Phthisis.

The urbanisation of the great mass of the people of England has increased the susceptibility of town dwellers to Tuberculosis in all its forms, as compared with their rural neighbours; and with nomadic tribes amongst whom as amongst animals who still remain in this wild or free and natural estate, tuberculosis is rare.

This migration of the people from the land, either through gregariousness or often the force of circumstances, was inevitably accompanied by the rapid growth of towns, before the great and far-reaching importance of town planning and sanitation, in determining the amenities, health and general well-being of every town or community of human beings was understood. Consequently, in these earlier times of ignorance the housing of the people was accompanied by some of the worst features of overcrowding and want of light and ventilation, especially amongst the dwellers in many old historic narrow streets and alleys, courts and back-to-back houses, where under such conditions the vices of improvidence and intemperance flourished, which in their train are the parents of poverty and destitution.

In these times the ravages of consumption were terrible and the mortality high. In England and Wales the phthisis mortality is one-half to-day what it was over 30 years ago, and in Rochdale to-day it is less than one-half what it was over 30 years ago. Now, as we have no evidence that the attacking bacillus has in any way become modified in its virulence and pathogenic powers, we must conclude that this great diminution in the phthisis death-rate, which is also an index to the diminution of invalidity and suffering, is due to improvement in environment. But since the present is the child of the past, many of our present day aspects and conditions of our towns have lived from the past into the present and now we may be said to be suffering from the omissions of our forefathers.

For in all the chief towns of England during these recent years, the greatest advance in sanitation and public health has been attained at the expenditure of millions of money in demolishing and clearing away slum and insanitary areas, and by the Health Authorities availing themselves of the light of modern scientific knowledge in all matters of sanitation and making sure that every house built, however so humble, shall be a sanitary one. For unless some system of town planning is adopted which has for its aim the development of the town concerned, along the lines which ensure the erection of artistic and hygienic habitations by predetermining for this purpose the most advantageous disposition and arrangement of streets, houses, shops, factories, and workshops and open spaces, such conditions as adequate light and sunshine, ventilation, cleanness, and the prevention of dust and dampness can never be attained.

No artificial devices can compensate the obstruction and exclusion of natural sunlight and ventilation and the disinfecting properties of direct sunlight ; for, where sunlight does not enter disease will.

In Tables XII. and XIV. one observes that the means of ventilation provided are neglected in about one-half the houses inspected ; but it is often rather difficult to persuade people to open their windows when many have become inured to the impression that windows must be kept shut to keep out dust and smoke. It will be for the town planning of the future to change this disposition of things, when windows will be opened because the pure breezes of heaven are refreshing. Dust and smoke are inevitable forms of matter, but matter in the wrong place when sweeping around the homes of the people.

It may be said at once that the terms ventilation, lighting, sunshine and cleanness, except in so far as they are modified by the personal equation in every case, are largely complementary ; as one is good or bad so do they all tend. In factories and workshops, common lodging houses and houses let in lodgings, some of these terms are more or less clearly defined ; but as regards dwelling-rooms there is no controlling legislation as regards lighting, ventilation, and overcrowding. In this respect our public health legislation is defective, while at the same time even within the scope of its provisions one cannot but advert to such terms as " sufficient this " or " adequate that," or " to the satisfaction of," which are of little or no administrative significance in the hands of the executive officer. Consequently we are in this phase of thought that while we recognise the virtue of open-air treatment for cure and for which we erect expensive Sanatoria, we fail to utilise this same agent as a preventive at home and at no expense.

In the interpretation of such terms there is the liability to litigation and arbitrary decisions, which tend to defeat the purpose for which such legislation is framed.

Dampness in Houses.

By referring to Tables XII. and XIV. it will be seen that more than one-half the houses in which cases were living when notified, and in which deaths occurred, were considered to be defective through dampness. The standard adopted was that no house was considered damp when such dampness could be explained as due to superficial and temporary causes, but only when the causes appeared to be due to structural and permanent defects. In this respect also, and as playing a conjoint part we must keep in view the prevailing climate and the soil on which the town is built. One of the earliest observers to establish a relationship between the prevalence of phthisis and damp soil was Dr. Bowditch, of America, who laid down the following two laws :—

> (1) A residence on or near a damp soil, whether that dampness be inherent in the soil itself, or caused by percolation from adjacent ponds, rivers, meadows, marshes, or spring soils, is one of the primal causes of consumption in Massachusetts—probably in New England, and possibly in other portions of the globe.
>
> (2) Consumption can be checked in its career, and possibly—nay, probably—prevented in some instances by attention to this law.

Amongst English observers the researches of Dr. Buchannan deserves the first place. He established the existance of general agreement in phthisis mortality between districts that have common geological and topographical features, of a nature to affect the water-holding quality of the soil ; and that wetness of soil is a cause of phthisis to the population living upon it.

These conclusions are substantially in agreement with more recent observers, although there have been put forward from time to time statements not only not confirmatory, but in direct opposition to these. Such statements are usually associated with some special or local circumstances and do not in any way invalidate the above general conclusions.

The significance of this is when we consider that, while we have a humid and wet climate, the soil on which the greater part of the town is built is of a clayey nature difficultly pervious to water and consequently a water-holding or wet soil. Hence, if cold and dampness in houses is to be prevented, it becomes a matter of supreme importance to ensure proper and adequate sub-soil drainage and the introduction of proper and adequate damp-proof courses, so disposed and constructed of such material as to be effective for the purpose for which they are intended. These precautions have an additional importance in this town, since the greater number of the houses are built on slightly sloping ground. Consequently, it becomes the more necessary to intercept by proper drainage the subsoil water on its way from higher ground ; for by such means the level of the ground water is lowered and its fluctuations lessened.

Although a wet soil or damp houses cannot in themselves, without actual infection, cause phthisis, they must be considered strongly predisposing causes. People living in such conditions are more liable to colds, bronchitis and other chest diseases, all of which prepare the way for the often too easy entry of the bacillus tuberculosis, when the resisting powers of the individuals attacked have been sufficiently lowered.

Intemperance and Destitution.

From all time tuberculosis has been essentially associated with these conditions, and when we add to these their congeners, overcrowding and underfeeding, we have a list of the most potent predisposing causes already discussed or known ; and if any one of these was to be considered more in the relation of cause to the others, it might be, and undoubtedly is in many cases, intemperance.

By referring to Tables XII. and XIV. it is stated that amongst the notified cases only 12 were considered to have pursued good habits, while 68 were of indifferent to bad habits. In followingt hese notified cases to the death Table we still find that during the interval between notification and death only five were following good habits while 29 remained indifferent to bad. On the other hand we learn that amongst the deaths from non-notified cases 45, or nearly the one-half were considered to be persons of good habits, 31 of indifferent habits, and 21 actually bad.

These figures have again a certain degree of correlation with the figures given as indicating the means of the respective families. These figures are calculated on a basis which will be fully explained in the Housing Report ; and the terms good, fair, poor, represent average incomes of 36/-, 27/-, and 18/- per week respectively. In the Notification Table XII. it will be seen that the means of only one family is stated as good, 6 as fair, and 73 as poor, according to this standard of income. In the Death Table XIV. the income of the notified cases is still poor, whereas amongst the deaths from non-notified cases, we find that 27 had incomes good to fair and only 26 described as poor, according to the above standard.

The self-evident reason is that all the notified cases with the exception of 11 were poor law cases, who had sunk to this low level ; and the more searching the enquiry made the more convincing was the evidence that in the great majority of cases the predisposing causes enumerated above played a prominent if not a dominant part.

From the very interesting and instructive statistics collected by Rowntree, we learn that the average expenditure per family among working people upon excisable liquors is 6/- per week, and by many this is considered a moderate estimate.

Then as we have already discussed some of the responsibilities of municipal authorities we must now for a moment consider the responsibilities of the individual chiefly affected, and in what manner we might expect him to aid in the crusade against tuberculosis. When analysed, much of this crusade resolves itself into getting rid of the above predisposing conditions ; and the question arises can the so-called poor and slum dweller assist in working out their own salvation ?

From some experience amongst such people one finds that there are roughly two classes :—(1) a very large proportion, who are earning wages which would be quite sufficient to enable them to pay the rent of commodious houses in more healthy parts, but who prefer the cheaper houses as it allows more money for drink and entertainments. (2) Another large proportion whose wage although small, yet if well spent would often be sufficient to provide better houses in a healthier part. Consequently, it has to be admitted that many of these so-called poor are poor because they will be poor. If temperance was practiced, combined with frugal living and cheaper but healthier forms of amusement, the slums and insanitary houses would soon become largely deserted, and the demand for such property become so small as to be unremunerative, and I feel sure no one would be more pleased to see this gradual change to a better state of things than property owners themselves, who naturally follow the law of supply and demand.

Thus with better housing, overcrowding and all the associated evils already enumerated tend to disappear. Hence, although certain primary responsibilities must always rest with Governments, Municipalities and Landlords ; yet every individual ought to, or must be made to recognise their individual responsibilities of good citizenship as expressed in due regard to the principle of self-respect and self-help as far as lies within each.ones power.

Accompanying the Report on Housing, will be two charts, in which an endeavour has been made to correlate the general housing conditions of this town with the vital statistics covering a period of eight years.

A serious and close study of these charts will impressively illustrate much that has been written in these pages ; and will sufficiently persuade as to the close relation of the death curve as also of its component parts as far as analysed, with the environmental conditions here discussed.

Administrative measures for the Control of and Prevention of Tuberculosis.

In all matters of public concern the experience of the past should be a guide to the policy of the future, and in no matter of public health policy is this more needed than in devising administrative measures against Tuberculosis.

In the centuries of the past so great has been the death-toll exacted and the incalcuable loss and suffering inflicted by this disease, that it has left its impress deep in the public mind ; and although frequently in the history of nations such extremities of disease or war seemed to have produced the cure or the man ; yet as regards tuberculosis, in spite of increasing knowledge, people still look and sigh for a cure ; while for centuries their extremities of despair have been the opportunity of races of sophists and quacks, who for commercial gain have vaunted all sorts of cures on anxious and too credible sufferers.

On the other hand there are few municipalities in any civilised country who have not now for many years been more or less actively engaged in devising and carrying out administrative measures against Tuberculosis. Such efforts have been largely supplemented and indeed often initiated by the great army of public benefactors, who, in subscribing or collecting large sums of money for the erection of Sanatoria and other ameliorative measures, and the great army of silent workers who in their private or social capacity have given of themselves and their means with a self-sacrificing devotion, which, although unrecorded, have robbed many a home and death-bed of half its terrors. The moment then seems opportune to enquire from the experience of the past how the problem presents itself to-day.

It has been frequently stated that this problem concerns itself with the tubercle bacillus versus the human race, and the machinery in operation or to be devised, therapeutical or administrative, or both combined, whereby the latter may exterminate the former. Now both have been in operation for many years, aided by voluntary workers, various agencies and sanatoria all over the country, and we are able to record a decrease in the phthisis death-rate by more than one-half of what it was 30 years ago.

But when we analyse the part played by the different factors, we have to confess with regret that to-day no more than 30 years ago has science been able to bring forth any reliable and specific cure for phthisis ; and this in spite of the epoch making discovery of the causal bacillus nearly 30 years ago ; and in spite of our accumulating knowledge of the biological and other characters of this bacillus, and the persistent application of the science and art of chemistry and therapeutics. True it is that almost every possible drug has been tried either by repute or empirically, but I am not aware of any drug the direct action of which is specific and lethal on the tubercle bacillus in a phthisical patient, without at the same time acting equally disastrously to the patient.

To Koch is due the credit of introducing a new phase of treatment. The principle of which is to antagonise the bacillus by products obtained directly or indirectly from itself ; and is now known as the tuberculin treatment. Without going further into the origin, history and science of the different tuberculins now in the market, it has to be said that the results from this treatment have been very disappointing.

It should be stated, however, that, when first introduced, the potency and consequently the dosage was ill-understood, and its application necessarily empirical. This difficulty has been largely overcome through the researches of Wright ; and although we have now a means of regulating the proper dosage of Tuberculin, it is difficult, at the present moment, having regard to its mode of action as presently understood, to hold out much hope of Tuberculin as a curative agent.

Tuberculin is a substance of great complexity and potency, and difficult to analyse. The whole subject of the active immunisation of human beings against the tubercle bacillus by the Tuberculin treatment is one of profound difficulty and should be considered *subjudice* pending further researches.

Many investigators have laboured to bring tuberculosis within the scope of serum-therapy, a method of treatment which is now rendering such signal and conspicuous services in acute infections such as diphtheria, where the rapid neutralization of the toxins of diphtheria is required and often the only hope of saving life. In tuberculosis the conditions are entirely different, and it must be confessed that the results of serum-therapy treatment, both as regards cases of human tuberculosis and in the case of experimental animals have been up to the present disappointing ; and although this line of treatment may also be considered *subjudice*, there appears in the circumstances less hope from serum-therapy than from a further development of the tuberculin treatment.

Consequently, I venture to think that neither therapeutics nor tuberculin treatment and serum-therapy have played any essential part in the reduction of the phthisis death-rate ; although they have their important uses in the hands of the medical man, yet it cannot be claimed that their prolonged study has as yet produced any specific curative or prophylactic treatment.

Turning then to the other aspect of the problem—administrative measures, we may at once state that the chief administrative measure adopted in the past as in the present by almost every Municipal Authority has had for its objective the improvement of the environment as it is expressed in improved sanitation.

This improvement in general sanitation during the past 50 years has been one continuous line of advance, and no matter how bad things may be to-day in some towns or limited areas, nor how much one sees yet to be done, we acknowledge with satisfaction the great work that has been already achieved, not only in general sanitation but by legislative enactments whereby people to-day are better housed, better fed, work shorter hours under more sanitary conditions with higher wages and more time for recreation and improvement than at any previous time in the history of England ; and I have yet to be convinced that there is any other country where the conditions of working, living, and feeding are more favourable for any working man than this country.

The importance of the environment of the individual although dimly seen as through a glass in the past, yet wisely considered and pursued by Health Authorities in the past, is now seen and studied in a clearer light. The life history of everyone is largely summed up in ones heredity and environment ; and in our study of means for the elimination of tuberculosis, since we have now the great weight of scientific evidence, which is to attribute more and more importance to environment, and proportionately so little to heredity as almost to become a negligible quantity ; it may be said that we are only now beginning to appreciate that, great is the power of environment in which each man, woman, and child live and move and have their being.

Consequently, with this progressive improvement of environment, which is here always used in the wide sense to include all physical and economic influences, aided by social and moral teaching, which has for its aim the inculcation of the duties of self-respect, sobriety, and good citizenship, not only has the general well-being of the people greatly increased and so likewise their resisting powers against infection, but the breeding dens of disease and means of infection have simultaneously been gradually diminishing. To such factors as these more than any other I am convinced we should attribute not only the great decrease in the phthisis death-rate, but also the well-nigh extinction of some infectious diseases and the mitigation and less prevalence of others. At the same time we do not overlook that this great work as regards phthisis has not only been greatly advanced but often initiated by the sympathetic army of public benefactors and the army of silent workers already referred to and to whom every community owes a deep debt of gratitude.

Many simple experiments might be adduced from the bacteriological laboratory to illustrate the above argument, and it also illustrates on a small scale what is taking place in the larger laboratories of nature—the sanitary area of each municipal or health authority.

It is the simple experience of every day life, that one is more susceptible even to an ordinary cold or any one of the more ordinary ailments, when ones vitality or resisting powers are below ones normal condition. Such diseases as Cholera and Enteric Fever are common to man, but none of the lower animals are susceptible to this disease under normal conditions. Yet these animals can be made susceptible by experimentally lowering their resisting powers to infection ; and again we have the interesting experiments of Trudeau, who inoculated rabbits with tubercular material and confined so many in a dark, damp place, without any fresh air or sunlight, while the others were allowed to run wild in their natural state ; the former succumbed rapidly, the latter recovered or only suffered slightly, and the lesson of the rabbits has its parallel amongst the higher animals under similar conditions.

With the foregoing conclusions and the facts in which they are founded in view, we may proceed to consider the outlines of future administrative procedure ; and while we continually scan the horizon of preventive medicine for better and more effective methods, it is safe policy meantime not to too readily discard any principle of action that has been found useful in the past, and consequently I am persuaded that our motto is still, "prevention is better than cure."

Tuberculosis comes much more within the scope of preventive medicine than either Measles or Whooping Cough, and indeed is so preventable that it ought to be prevented. Even in the early stage of phthisis the disease tends to self-cure, and in most cases amendable to proper treatment. But on the other hand, when the disease remains undiagnosed and untreated in the earlier stage, as so frequently happens amongst the poor, it is in the later stages rarely if ever curable.

Administrative Procedure in this Borough.

The institution of administrative procedure for the control of phthisis in this Borough may be said to have commenced in 1901, when it was resolved that every house where a death from phthisis had occurred should be properly disinfected by the sanitary department. This was followed in 1902 by the appointment of one Lady Health Visitor, and as a further step along with many other towns a system of voluntary notification of tuberculosis was introduced in 1904, in which medical men were invited to notify cases coming under their notice and for which the usual notification fee was offered.

During the following two years, 1905 and 1906, voluntary notification brought the knowledge of 37 and 39 cases respectively to the notice of this department ; and as this important branch of health administration was apparently increasing, another Lady Health Visitor was appointed in 1906. Since then the procedure has been as follows :—

I.—Living Cases.

(1) These on notification are visited by the Lady Health Visitors or other members of the sanitary staff as frequently as possible according to the circumstances of each case. Advice is given personally and by card regarding such precautions as should be taken in coughing and expectorating to prevent the infection of others ; the relative advantages and proper methods of dealing with linen and paper handkerchiefs and spittoons ; the value of sunlight, fresh air and proper methods of ventilating living rooms and bedrooms ; the value of wet cleansing of rooms to avoid dust ; the necessity for patient to have separate bedroom when possible ; proper methods of washing and disinfecting clothes, floors, etc., and any other advice and assistance which the circumstances of the case may demand.

(2) All disinfectants are supplied in reasonable quantity by the Health Department.

(3) If this department is notified of removal of any patient from one house to another, the house vacated is properly disinfected by the sanitary staff before re-occupation by another tenant.

(4) The bacteriological examination of sputa is done free of charge for all medical men practicing within the Borough. For those outside the Borough a nominal charge is made.

II.—Death Cases.

House, clothes and furniture are disinfected by the sanitary staff.

It has to be said, however, that up to the end of 1908, the hopes entertained on the institution of this important work in 1904, have not been realised. For although voluntary notification has been very successful in some towns, somehow or another, in this Borough, it has been either growing into disfavour or it may be merely into disuse or both ; as the cases notified from 1905 to 1909 inclusive are 37, 39, 21, 13, 11 respectively.

Attitude of English and Scottish Local Government Boards.

Recently the whole aspect of this question has changed. Up to 1908, the attitude of both the English and Scottish Local Government Boards towards the compulsory notification of phthisis was one of sympathetic reserve, which was undoubtedly due to the lack of unanimity amongst medical and public health authorities. In the early part of 1906, however, the Scottish Local Government Board, by circular letter, declared pulmonary phthisis to be an infectious disease within the meaning of the Public Health (Scotland) Acts. The circular also indicated that a system of complete notification promises the solution of many of the difficulties of this problem, and is further necessary if the provisions of the Public Health Acts are to be applied effectively. Consequently, any local authority in Scotland may include pulmonary phthisis to the list of diseases notifiable under the Infectious Diseases Notification Act, 1889, which Act is applicable to both England and Scotland.

In the same year the English Local Government Board also made a great although limited advance towards compulsory notification by its issue of the Public Health (Tuberculosis) Regulations 1908, to all Sanitary Authorities and Boards of Guardians ; and, which makes all poor law cases compulsorily notifiable ; and came into operation on the 1st January, 1909.

Since then, during the past year, the work of this department in dealing with phthisis cases has greatly increased ; when one keeps in view that from 13 cases notified in 1908, there were 107 under the new regime. The methods by which this work has been carried out—by repeated visitations to all cases, and instruction given by card and verbally, and any other assistance which the necessities of the case appeared to demand, while at the same time collecting much valuable information, which forms the basis of this report—have already been adverted to and described.

As a contrast I will now briefly sketch some of the more active measures which are now in operation in many Cities in America, Germany and France ; and which are now gradually being adopted by English and Scottish Health Authorities as supplementary to such as have been already described and as more effective methods, not only for the control of, but in view of the greater ideal, the extermination of tuberculosis. In the initiation and development of this more active crusade, probably no name in this country deserves to be more closely associated with it than Dr. R. W. Philip, of Edinburgh, who, over 20 years ago began a pioneer movement by the establishment of a small dispensary for the treatment of tuberculosis, and to which all poor people were invited and encouraged to come for free advice and treatment. From this small beginning the dispensary grew, and is now a well-known institution—the Royal Victoria Dispensary for the treatment of Consumption, with an average attendance of nearly 20,000 per annum.

By continued progress the Institution now embraces a completely organised system, the component parts of which are :—

I.—Notification of Tuberculosis made compulsory by Health Authority, 1907.

II.—A Tuberculous Dispensary.

III.—A Pavilion for dying patients provided by Health Authority at their Fever Hospital.

IV.—A large and well-equipped Sanatorium near the Town for selected patients with a view to cure, and for the temporary treatment and education of others as to the best methods of living and for preventing the spread of infection.

V.—Colonies for the residence and guidance of patients in whom the disease is latent, or has been arrested and for whom carefully selected and supervised employment is desirable.

In this arrangement we have the conjoint and harmonious working of the Dispensary for Consumption with the Public Health Department. It might be added that the Victoria Dispensary and Sanatorium, although very large institutions, have been maintained throughout entirely by voluntary subscription.

Compulsory Notification of Phthisis.

This question of the compulsory notification of phthisis has been before the public mind now for several years. It has been discussed at various international congresses and at meetings of various learned and leading scientific and medical societies, and by most public health and municipal authorities ; and the unanimous opinion is, that as phthisis is an infectious disease it should be treated as an infectious disease, and from the public health point of view and the prevention of infection there is as much if not more reason why it should be notified and dealt with as any other infectious disease ; and further, that if any well-organised scheme is to be effective compulsory notification must form an integral part.

Public opinion, although adverse at first, I venture to think is now beginning to realise the truth of this, and that nothing but good can result from complete notification of all cases, and this change of opinion would be greatly facilitated if all lingering misconceptions regarding what is meant by notification—its advantages and disadvantages—were dispelled. The majority of the patients suffering from the various infectious diseases, which are up to the present notified, belong to the younger section of the population ; many of them are children and not to any extent breadwinners; whereas if those suffering from phthisis were to be all notified, we would then have to deal with the young adult, and mature adult sections of the population, who in most cases are householders and bread-winners with families or other dependents. It then becomes necessary for the success of this scheme, that those affected and for whom it is framed should clearly understand what advantages it provides not only for them and their families, but also to the community and nation in which they live, and to the cause of preventive medicine.

It may be said at once that the disadvantages and difficulties which have been urged against notification of phthisis were in the same manner advanced against the notification of other infectious diseases in the past ; but the experience of the past has shown that they only existed in theory or in the imagination, and need not be further considered.

Advantages of Compulsory Notification.

As every health authority bears a certain responsibility for the general sanitary and health conditions prevailing in its district, it is incumbent on any such authority to keep itself well-informed regarding the magnitude and progress of all infectious and preventable diseases, as also all conditions favouring the perpetuation and dissemination of infection. Hence, from the stand-point and exigencies of public health administration, phthisis should be notified.

Every one recognises that the early notification of any infectious disease is the first step in preventive measures against it ; and if it devolves on health authorities to take such measures it is surely reasonable that all such cases should be notified without delay.

Again, the public health staff are in the best position to investigate each case, if considered necessary, because it is our experience that frequently the notification of one case reveals a nest of others more or less connected through cause or effect. Then around each case must centre the further measures to be taken—whether treatment is to be undertaken at home by the patient's physician with or without any co-ordinated assistance of supervision by the health staff except in so far as concerns disinfection, which should always be undertaken by the sanitary staff, or whether sanatorium or hospital treatment should be adopted, and here again, in the work of supervision and disinfection the public health staff are in the most advantageous position for carrying on this work.

Such considerations then lead up to Part II. of this scheme—Tuberculous Dispensaries.

Tuberculous Dispensaries and their field of work.

The dispensary is an important factor in the campaign against tuberculosis. It is an institution to which all poor people are invited to attend for examination and advice, who are already suffering from or supposed to be suffering from consumption, as it is amongst these classes that consumption is most prevalent and the dangers of the spread of infection greatest, through lack of proper advice and treatment.

It is a notorious fact and the experience of every medical man that especially amongst the poor and lower-wage earning classes, and to a smaller extent amongst the better artisan classes the disease is not diagnosed until some serious symptoms supervene, such as the spitting up of blood due to the breaking down of the lungs, when the disease has considerably advanced ; and at this stage, although the disease for a time under appropriate treatment may be arrested can never now be cured. In this manner many lives of promise and usefulness, in the very prime and vigour of manhood and womanhood, either cut off or considerably shortened with its accompanying infirmities and financial ruin ; whereas if the disease was earlier diagnosed and treated, many of such lives would be conserved for the support of their homes and to contribute by their industry to the wealth of the nation. This state of things is the more regrettable when we contemplate that the knowledge of methods of prevention is now well understood and always increasing, and the medical service of England never more capable of rendering efficient and effective service in the dissemination of the gospel of prevention, not only of this, but of many other diseases of which it may be said that prevention is better than cure ; but through lack of organisation and co-ordination between the various health, hospital, poor law, educational, lunacy and other authorities, such knowledge and effective medical service is lost to the great number for whom it is most desirable, who through ignorance, indifference or limited means put off as long as possible going to the medical man, and only when compelled by urgent symptoms as already stated. Consequently, many of these through increasing stress and strain of failing health and financial difficulties, fall by a gradual declension from the ranks of the artisan and regularly employed classes to the ranks of the casual labourer, the unemployed and the unemployable, and ultimately require poor relief or may reach the workhouse ; and once a man or a family sinks to the low level of pauperism the sense of self-respect and independence so frequently vanishes that their descendants from generation to generation may pursue the life of pauperism.

To such causes as these and other problems of a social nature are largely due to the great wastage of human life and the ever increasing burdens of poor law expenditure and the greater problem of poor law reform which is now before us for solution.

The magnitude of the work and need of organisation.

The recently issued report of the Poor Law Commission, which takes the form of a majority and minority report, is a document of great weight, and deserves serious consideration.

In this report one sees the magnitude of the problem and its many ramifications, and the many administrative departments concerned, which through the lack of organisation and co-ordination are proving so ineffective yet extravagant to the nation. The methods of solution offered differ in many respects fundamentally, and the Minority Report which proposes to recast our whole administrative machinery and is at present receiving most attention has in it certainly the merit of boldness and definiteness. But whichever report is adopted, or perhaps some modification, I venture to think that the guiding principle will be to utilise all available knowledge and the teaching of science to the essential fundamental question of prevention of destitution and disease, in so far as it is practicable, and in such a manner as to engender a higher sense of individual responsibility and to stimulate a more strict administration of public health measures. This will necessarily involve some organisation and adequate adjustment of the medical service.

In this respect the growing practice of the " sweating of the medical profession " by hospitals, clubs, dispensaries, friendly societies and all similar organisations must receive serious consideration. This growing practice of attempting to take undue advantage of the nobility and generosity of a profession, which has at all times rendered to the poor much unremunerated service, is to be deprecated, and operates prejudicially to those for whom such services are desirable.

The tuberculous dispensary, where in use, has to some extent mitigated these defects in our public health administrative machinery, but they only can be considered as temporary, while we continually keep in view the larger ideal of a more comprehensive and co-ordinated scheme of public health administration.

State Interference and Charities.

At the same time I am quite well aware that there are many who entertain grave doubts as to the advisability of more State interference and regulations ; and who argue that the principle of state-aided institutions and services is wrong, and has a pauperising effect on the people for whom they are intended. Undoubtedly a great principle is involved and around which there has been interminable discussion, which I will not pursue further than to say that indiscriminate giving, whether by the State or private charity, can have no other result than tend to breed pauperism. There is no nation, of which I am aware, in which more money is given for supposed charitable purposes than England. But much that is given through pity is not charity. A philanthrophy which consists in giving doles as a mere palliative without searching diligently to find and to remove the cause of mischief and restore a normal condition, will always fail in attaining the highest good, and rather on the other hand tend to breed more suppliants and the disposition to pauperism. Already we have free education, and more recently the State has undertaken the medical inspection of school children ; but I fear that if the latter is to be successful and the children to derive any benefit from such inspection, the State will now require to devise some means of treatment, just as will require to be done in any scheme for the effective control of Tuberculosis. But the State in giving free institutions should study consistence and national economy, and whatever is made free let it be such that, by State or Municipal control, not only will the individuals for whom it is intended benefit, but at the same time the nation, and in the end tending to national and municipal economy.

The general programme of such an institution is usually as follows :—

(1)—Medical examination of patients and keeping records of such and of any subsequent examinations.

(2)—Bacteriological examination of sputum and notification of cases.

(3)—Instruction of patients regarding all the matters of prevention and disinfection so that they may live harmless lives.

(4)—The selection of suitable cases, either for cure or instruction, or both in Sanatoria ; and of far advanced cases of whom there is little hope of cure, for incurable homes or Hospital.

(5)—The dispensing of necessary medicines, disinfectants, and the giving on loan of any articles such as spit-bottles, etc., according to the necessities of each case.

(6)—The supervision of poor cases at their own homes ; as also cases on discharge from the sanatorium or from hospital.

Such an institution in this town need not be open more than two or three times per week for a few hours, at which time the dispensary physician attends to examine cases.

The rôle of Sanatoria and Sanatorial Treatment.

Then comes the sorting out of these poor people and directing them on the course they should pursue after passing through the dispensary. Some will return to their homes and the visitation and supervision work carried on by a specially trained nurse or by the Lady Health Visitors. For others again in the early stage of the disease, and when in most cases it is readily curable, sanatorium treatment is in the highest degree desirable. But as one is sometimes now met by the question " are sanatoria worth while ?" it may tend to clearness to state at once that the conception of building sanatoria has bulked too largely in the minds of some authorities, and that the public have been led to expect too much from sanatorium regime, both as regards the cure of individual patients and of the extinction of the disease. Experience has taught that the sanatorium forms an integral part of any well-devised scheme, but its true functions and possibilities have to be clearly understood : (1) Treatment of early cases for longer or shorter periods with view of complete cure or arrest of disease. (2) Short periods of discipline in measures to be adopted at home as regards treatment and means of preventing infection of others. Without this clear understanding it has been too frequently the practice to send so may advanced and dying cases to sanatoria for whom there was no hope of cure. Hence it is quite true, that under this misconception of the true functions of sanatoria, they have not produced the results anticipated. Under sound sanatorium treatment, and if undertaken sufficently early, it is the exception to find a patient who does not make rapid progress towards permanent cure or at least arrest of the disease. Then the educational and disciplinary value of such institutions is of national importance, and to bring as many as possible under its influence, it is the practice in many districts to pass as many patients as possible through the sanatorium by admitting them from one to two months. These, if grateful and self-respecting patients will, after learning how to treat themselves and how to prevent infecting others, go forth as apostles and teachers of the new gospel to others.

Even the short period of removal to a sanatorium may be just sufficient to alter the whole complexion of the future outlook of the infected home ; while the patient is in the sanatorium his home is disinfected and relatives and inmates free from the risks of continually recurring infection, and the result of the short treatment, although falling short of cure, may be sufficient to arrest the disease for a considerable time, and consequently the working life of the patient is thereby prolonged.

It is for this reason that the Sanatorium should be reasonably near the town from which it is intended to receive patients. We now recognise the universal applicability and benefits of the open-air treatment of Phthisis in all climes and countries where this disease is found.

Some Economic Considerations.

Some conception of the economic aspect of this question and the great loss to the home and the nation through the infirmities of this disease may be gathered from a consideration of the immense economic value of working men's sanatoriums under the system of compulsory insurance against sickness in Germany. Since the year 1897, Insurance Societies and Companies in Germany have expended nearly £13,000,000 of money in building and in the maintenance of their clients in sanatoria ; and have found it more profitable by such expenditure to get as many of their patients as possible back to working life, than the continual payment of their insurance allowances.

Again statistics show that one-eleventh of all the pauperism in this country is due to consumption ; and as the total cost of pauperism in England and Wales is between £11,000,000 and £12,000,000 of money per annum, the portion of cost due to consumption is about £1,000,000. Then it is calculated that to provide sanatoria for all the working classes who constitute 70 per cent. of the population, beds would require to be provided for an average annual admission of 28,000 patients. This on an average stay of six months per patient would require 14,000 beds, and the annual maintenance of each bed about £65. The whole scheme would require about £1,000,000 per annum.

It is then an economic as well as a humanitarian question, whether it would not be better to spend the £1,000,000 in preventing consumption than in spending it for the relief of pauperism and destitution due to consumption, and thereby reserve for the home and the nation the worker and bread-winner, and prevent the financial ruin of many homes and an amount of suffering and human misery of which statistics make no record.

Tuberculosis Colonies.

These are an essential extension of sanatorium treatment, and are specially provided for a large number of patients, who although not having the benefit of early treatment with its hope of cure, nevertheless improve every day while in the sanatorium, and sooner or later as the time for discharge approaches, the question arises what is the best thing to be done for such patients ; as return to ordinary occupation is apt to be synonymous with relapse. For such patients tuberculosis colonies are necessary for extended treatment.

In such a scheme as this it has to be kept in view that sanatorium treatment does not denote a life of idleness. A sanatorium should be a kind of working colony, where patients subject to doctors' directions, contribute by their own regulated efforts to the upkeep and management of the place. Neither need sanatoria nor their adjunct colonies be expensive institutions. The essential principle of treatment is the free exposure of the patient to the open air. He must be bathed in fresh pure air day and night, and this irrespective of the goodness or badness of the weather. There are two things inimical to the tubercle bacillus—fresh air and sunlight ; and consequently the patient must be out of doors, lying, walking, sitting or working according to the nature of his case for a large part of the day ; and when indoors, allow the freest access of fresh air day and night.

Then as the residents for the colony would be selected from patients whose disease had been successfully treated in the sanatorium, they would be able to work ; and hence a tuberculous colony should be a colony of workers. For such colonies many of the broad and uncultivated acres of England would form the necessary domicile, and it has been already shown that such colonies can be made self-supporting from the produce of the soil, and the practice of the trades and handicraft of the workers so far as consistent and practicable.

Hospitals for Advanced and Dying Cases.

The last part to be considered is the Hospital for the advanced and dying cases. In any scheme this is an essential part, for there can be no manner of doubt but that the far advanced or dying cases are the greatest source of infection. In many homes of the poor, as already described in this report, where an entire family, young and old, may be occupying one or two rooms with the dying consumptive patient, there is little or no possibility of preventing the infection of others unless such a patient is removed to a hospital reserved for such cases. Once removed to hospital patients must in the ordinary course remain until the end supervene. Any other arrangement by which patients are admitted, and when slightly better take their departure, only probably to seek readmission at an early date, is to render futile the primary purpose for which such a hospital is instituted, both from the point of view of preventing infection and from the sanitary and economic standpoint.

In providing such hospitals some authorities have set aside a portion of their infectious diseases hospitals, and where a sanatorium exists a portion has likewise been utilised for such cases. This latter arrangement has much to recommend it in obtaining the consent of patients to institutional treatment. For, when such patients are relegated to a separate hospital they have often a deterrent feeling on entering a place from which no one is supposed to return ; whereas, even although conscious of dying, yet there is seldom such a feeling on entering any institution in which there is still the hope of life to those who enter.

We shall conclude this review of administrative procedure for the prevention and control of phthisis by returning to consider the present position and attitude of this Borough, with some suggestions for future consideration.

Some Considerations on the Compulsory Notification of Phthisis; and Administrative Measures.

A synopsis of the present measures in operation in this Borough have been already detailed; and the question is before this Health Authority at present, should compulsory notification of phthisis be adopted?

Now compulsory notification has been in operation in several countries, such as America and Norway, and in several of our own cities for many years; and it may be said to have proved of greater or less benefit to those for whom it is intended to benefit, and likewise of greater or less administrative value in control of the disease, just in proportion as the people and the medical and health authorities respectively, more or less clearly understood, recognised and provided for the essential conditions and requirements for the harmonious and co-ordinate working of such a scheme. One would suggest for every health authority before deciding to adopt compulsory notification to consider the question—After notification, what then? In this Borough a system of voluntary notification was instituted in 1904, and it is interesting to enquire why it has not fulfilled its early promise. The only valid objection, and one which must always operate against and limit the scope of any system of voluntary notification is that in the absence of any statutory obligation the action of the doctor who notifies is not free from the risk of disfavour with his patient unless the consent of the latter was first obtained, and consequently under this system notifications have been chiefly of the poorer classes, and those treated in poor law or public institutions. Still this does not explain why 37 cases were notified during the first year, 1905, and only 11 last year, as the conditions under which cases are voluntarily notified remain the same.

Turning to the other aspect of the question, have we seriously considered the purpose of notification under either system, voluntary or compulsory, and answered safisfactorily to ourselves, as well as to those who notify and those notified, "after notification, what then?" Are we prepared for compulsory notification, and what have we to offer those who are notified?

It may be at once stated that in the experience of the past as will likely be in the future, the success of notification, whether voluntary or compulsory depends in the main on the extent to which a local authority and its officers can be helpful to the notified patients. This especially applies to voluntary notifications and undoubtedly differentiates largely as the cause of success or failure of voluntary notification in the different towns of England.

Arguing then from our experience of voluntary notification, and while keeping in view the desirability of the early adoption of compulsory notification; we have still to consider if it would not be somewhat premature to adopt a system of compulsory notification before we have an efficient and effective organisation both as regards:—(1) Health Visitors qualified through knowledge, training and tact for such work as investigating sources of infection, advising patients as regards modes and habits of life conducive to the maintenance of health and in detail of personal hygiene and disinfection so as to prevent the spread of infection to others; (2) Some provision for the treatment of the many early notified and curable cases; and for the training of many others in whom the disease is more advanced; but yet, after one to two months sanatorium discipline the disease may be so arrested that they are enabled to lead longer and more useful, while at the same time harmless lives as regards the spread of infection. For it is common experience that very few of such patients can be trusted to follow out faithfully and scrupulously the instructions and rules given on any card, until they are convinced of the personal benefits to be derived in doing so, through the inculcation of these rules, by the strict discipline of sanatorium treatment. Hence it is that home treatment is often unsatisfactory and fails in spite of all the good advice available.

The necessity for the provision of a special hospital or the setting aside of wards in other hospitals or sanatoria; as also the advantages of a Tuberculous Dispensary for the working of any scheme which aims at effective control have both already been discussed.

Meantime, in the absence of these institutions which form the component parts of a more complete scheme, we have to consider if we are utilising all our available resources for the prevention and control of phthisis.

Throughout this article I have endeavoured to emphasise the importance of environment, which here includes all conditions and influences affecting the well-being of the people, such as personal habits and domestic hygiene, housing and municipal sanitation, and the maintenance of a reasonably pure supply of water, food, milk and fresh air ; for it cannot be too strongly emphasised, as has often been stated by Newsholme and Philip ; that each factor is doubtless of value and each department has its own sphere of operations. As isolated elements their possibilities are relatively limited ; but in proportion as they are intimately connected and co-ordinated, they each become more serviceable ; and hence the path of success lies in the harmonious co-ordination of well-directed measures.

With this in view, the administrative measures already in operation in this town and already detailed are good in so far as they go and can be accomplished, but they are capable of considerable extension ; and the various directions in which this should take place are indicated throughout the text.

Further, the introduction of the fresh-water carriage system will provide the readiest, cleanest and most sanitary method of removal of sewage ; and will greatly facilitate more efficient methods of cleansing and scavenging, about which we have yet much to learn, as regards time and place and methods ; and that the primary purpose in cleansing is to allay and remove dust rather than to raise and scatter it about.

Educative Measures.

It is further a matter worthy of consideration if more active measures could be adopted to dispel the want of knowledge and indifference which prevails regarding the significance of the early symptoms of tuberculosis, the advantages of early treatment, and other preventive measures.

From what has been stated regarding the dangers of infection from indiscriminate expectoration, it might be considered advisable by this Health Authority to introduce some public regulations regarding this habit in factories, workshops, and in public places. Most Railway Companies now exhibit such notices in railway carriages and stations, and most local authorities owning tramways have bye-laws prohibiting spitting in the cars. It must be said, however, that such bye-laws are only effective and of educative value in proportion as they are strictly administered.

The prevention of spitting in streets and open places is not at present practicable, although it is gratifying to find that the streets in Rochdale are comparatively free of this nuisance when compared with those in many other towns. Still the exhibition of small white enamelled iron tablets at suitable places would do much to educate public opinion and tend to keep the streets cleaner. The continual remembrance to do what is right often makes the right done.

In looking around for the most effective means of disseminating this knowledge one naturally thinks of the great and useful work which might be done by the schoolmaster, for if ever we are to arrive at a rational system of education, which recognises that it consists in the development of a sound mind in a sound body, then the teaching of personal hygiene and the ordinary simple laws or lessons of health should form an essential feature in every school curriculum. To this it may be said that the school curriculum is already overburdened, and it is so.

But I think every schoolmaster recognises that while all children of natural ability should have a sound elementary and practical education, having some correlation with their mental capacities ; and since only those with special aptitude and ability can with profit to themselves and the State pursue the study of higher education ; the education best suited for the majority will be that which just qualifies each to fit into the special sphere of work for which each is best adapted by natural aptitude and ability ; and that much of this so-called higher education for those who cannot benefit by it has often the tendency to unfit many boys and girls from becoming good workmen and good housemaids respectively for the sake of becoming very mediocre grammarians. Consequently, one cannot help thinking that some of the time now devoteted to what is termed higher education would be much more profitably spent, both as regards the child and the State, in the exercise of such physical education as would tend to develop a body which could sustain and carry a head, and that part of the education of this head should be how to look after the body so that the individual may grow up a healthy industrious and self-respecting citizen.

Again, there are those who argue that children at school are too young to receive such instruction, but it should be remembered that true education does not consist in packing the mind of the child in a given time with a certain amount of intellectual pabulum which it is supposed to reproduce on a sheet of paper on a given day at a certain examination ; but rather in the harmonious development of all the faculties of mind, and the laying up at the most impressible and receptive period of life a store of useful knowledge for guidance and direction in after-life. For this purpose there are no more suitable and interesting subjects than personal and public hygiene, which is a part of nature studies ; and there is no child whose intellectual interest is not keenly arrested by lessons on air, earth, water, food, clothing, cleanliness and talks about common colds and consumption in so far as relates to personal and domestic hygiene. Further, is it not the experience of all of us that what we learn well in youth we rarely forget in later life, no matter in what diverse circumstances we are placed in ; and hence the hope in educating well the children of to-day ; who, save in a small percentage of cases are given to us an unsullied page, upon which we may write what we will ; whereas there are many of the present generation for whom any educative or ameliorative measures will be of little avail. But they must pass away and unit after unit replaced by the children of to-day, who will be the men and women of a future day.

TABLE XVII.

RESPIRATORY AND TUBERCULAR DISEASES.

Comparative Table of Death-rates of neighbouring Towns during 1909, along with the same rates of England and Wales for 1908.

TOWN.	Rates per 1,000 of Population		
	Phthisis	Other Tubercular Diseases.	Other Respiratory Diseases.
Bury	1·19	0·33	3·85
Preston	0·90	......	2·70
Warrington	1·15	0·64	3·45
Wigan	0·72	0·58	4·90
St. Helens	1·02	0·73	3·60
Oldham	1·40	......	4·10
Halifax	1·10	0·45	2·60
Stockport	1·39	0·63	3·87
Blackburn	0·90	0·40	3·60
Burnley	1·12	0·58	3·83
Bolton	1·15	0·31	3·27
Rotherham	0·69	0·34	2·54
Huddersfield	1·08	0·46	2·78
Bootle	1·10	0·29	3·40
Accrington	0·73	0·38	3·22
Bradford	1·07	0·38	2·69
Leicester	1·18	0·33	2·30
Leeds	1·14	0·57	2·87
Birmingham	1·34	0·29	3·04
Liverpool	1·30	0·50	4·40
Nottingham	1·28	0·38	3·37
Sheffield	1·10	0·40	2·90
Manchester	1·70	0·57	3·90
Salford	1·50	0·60	4·40
Average of 24 Towns	1·14	0·42	3·40
ROCHDALE	1·07	0·31	3·05
England and Wales (rates for 1908)	1·12	0·47	2·49

Comparative Phthisis Mortality of Rochdale with other Manufacturing Towns.

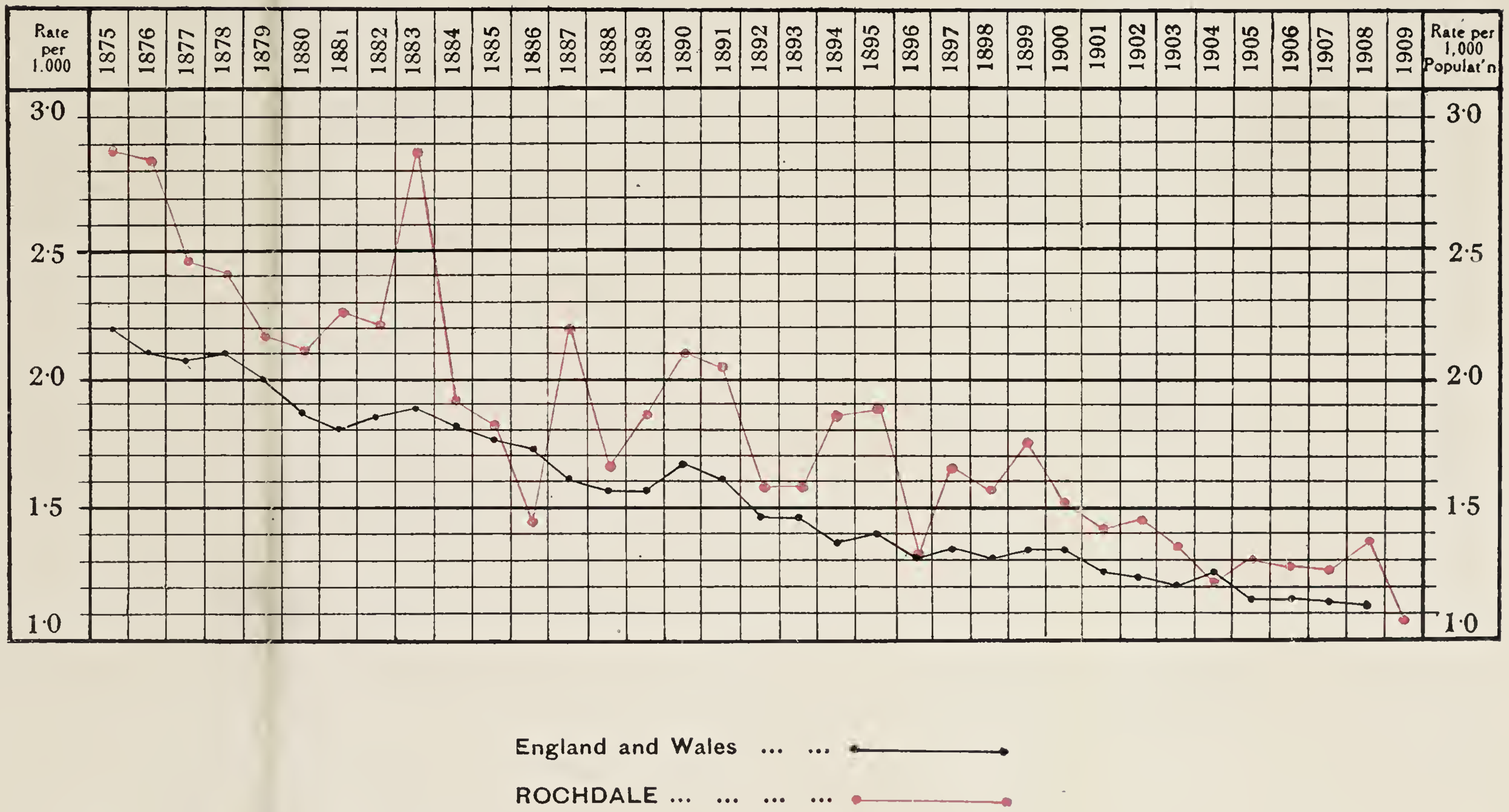
Table XVII. shows the relative position of Rochdale when compared with other manufacturing towns as regards death-rates from phthisis, other tubercular diseases and other respiratory diseases.

From this table one learns that Rochdale compares not unfavourably with other so far comparable and manufacturing towns. Amongst these Rochdale has the sixth lowest death-rate from phthisis, and the tenth lowest death-rate from other respiratory diseases. When on the other hand we compare the death-rates of the towns with the death-rates for England and Wales, we find that, while the phthisis death-rate for the towns does not differ in any degree from that of the whole country, the town death-rates from other respiratory diseases is considerably higher than the rate for England and Wales. The cause or causes of this high death-rate from other respiratory diseases in manufacturing towns, and which are chiefly due to Bronchitis and Pneumonia, require further investigation.

In conclusion, let us hope that while we pursue such measures as lies in our power we may keep in view the greater ideal of more active and effective measures ; and, that when so many neighbouring towns are having sanatoria erected or presented by public benefactors, we may hope that Rochdale will soon have the benefits of a sanatorium through the munificence of some of its many public spirited and affluent citizens. For it cannot be too strongly emphasised that for the control, prevention and final extirpation of tuberculosis each health authority must recognise its own joint-responsibility, and that success will be attained in proportion to the organisation and harmonious co-ordination of well-directed measures.

CHART D.

Death-rate from Phthisis per 1,000 of population, for Rochdale, compared with the same rate for England and Wales during the past 35 years.



SECTION III.

Departmental Work.

Work of Lady Health Visitors.

The scope of the Health Visitors' work in looking after the infants has been adverted to in article on infantile mortality, Section I. The number of visits made regarding this and other matters within the scope of their work is given for 1909 and the preceding two years in the following Table. It has to be added, however, that this Table does not include all their work, as they are frequently engaged on duties of a special nature ; and it is satisfactory to record that they have performed all duties assigned to them with zeal and fidelity. It is also equally gratifying to be able to record that so far as I am aware their work is being accomplished in harmony with all concerned ; and in this respect we wish to acknowledge the courtesy and assistance given us by the medical men of this town, and to all others who are interested in this missionary work. Indeed, I venture to think that, while we are all inspired with the hope of doing good, and the field of operation of the Health Visitors so wide, one rather wonders how such work should come into conflict in any direction, if a little tact and forbearance is studied, for there is every evidence that their work is being greatly appreciated amongst those for whom it is intended to benefit. With the compulsory notification of poor law Phthisis cases the work of the Health Visitors is greatly increasing, as also due to this and other causes the general work of the whole department.

Summary of Health Visitors' Visits, 1909.

	1909	1908	1907
Total Visits	5,733	6,265	6,406
Revisits for purpose of superintending the carrying out of the suggestions and advice given—especially regarding infant nursing and feeding ...	2,930	2,863	2,796
Births	2,219	2,322	2,062
Infant Deaths	199	365	256
Diarrhœa Deaths	3	26	2
Cancer Deaths	...	43	94
Phthisis Deaths	95	120	114
Other Tubercular Diseases	...	12	13
Phthisis Notifications	80	24	25
House to House Visits	102	239	741
Puerperal Fever	4	5	10
Complaints	19	66	45
Midwives	82	180	205
Small-pox (*re* Vaccination)	...	...	43

The nuisances reported by the Health Visitors are included in the statement of Nuisances contained in Section III.

The Notification of Births Act, 1907.

This Act was adopted by your Council and came into operation at the beginning of May, 1908.

It provides for the notification of the birth of every child born in an area in which this Act is adopted, within 36 hours after the birth.

The duty of notification rests upon the father of the child, if he is actually residing in the house where the birth takes place at the time of its occurrence, and of any person in attendance upon the mother at the time of, or within six hours after the birth ; such notifications to be made to the Medical Officer of Health.

Any person who fails to give notice of a birth in accordance with this section is liable on summary conviction to a penalty not exceeding twenty shillings.

The Act applies to the notification of any child born after the expiration of the twenty-eighth week of pregnancy, whether alive or dead.

I have already in the article on Infantile Mortality adverted to the great advantages derived from the adoption of this Act in this Borough, as regards all our work which pertains to the welfare of the infants. Under the old Registration Act of 1837, which allows six weeks for registration, although we had an arrangement with the district registrars whereby weekly returns of the births registered were supplied to this office, yet it frequently occurred that five or six weeks elapsed before the information of a birth reached this department.

But by the adoption of the Notification of Births Act, the Lady Health Visitors are now able to pay a visit at the most critical period of the child's life—within the first few days—and to give advice to such cases as appear to require it.

The weekly returns of births registered are still supplied by the District Registrars; and are a means of detecting defaults of notifications under the Notification of Births Act.

The number of children born alive during the year under notice was 2,069; and the notifications under the Act of 1907, were as follows:—

Births notified by Midwives ...	1,686 ...	82 per cent.
,, ,, Medical men	223 ...	11 ,,
,, ,, Parents ...	88 ...	4 ,,
,, not notified	72 ...	3 ,,

The still-born children notified numbered 114. Of these 80, or 70 per cent. were notified by Midwives; and 34, or 30 per cent. by medical men.

Of the 72 births not notified, 28 occurred in Dearnley Workhouse. The remaining 48 were either cautioned by letter or verbally; and the chief reason for failing to comply with the Act was that of being unaware of its requirements. Since the Act has become more generally known little trouble has occurred in obtaining prompt notification of birth.

Here again we wish to express our indebtedness to the Medical Men and the Midwives for their loyalty and punctuality in observing the provisions of this Act.

Midwives Act, 1902.

During the year under notice 49 Midwives gave notice of their intention to practice. Four of these reside outside but practice inside the Borough.

The qualifications of these Midwives may be seen from the following summary:—

Certificate of Coombe Hospital, Dublin	2
,, Obstetrical Society, London	2
,, St. Mary's Hospital, Manchester	5
,, Workhouse Infirmary, Crumpsall	1
,, Central Midwives' Board (by exam.)	8
In bona-fide practice as a Midwife for at least one year previous to the passing of the Midwives Act	31

Eight of the midwives practice monthly nursing in addition to midwifery; and two others do no midwifery work, but are engaged with nursing.

It is satisfactory to note that, in this district, the number of properly trained midwives is gradually increasing, whilst the older untrained midwives are decreasing. With many of the latter some little difficulty is experienced in making them understand the value of disinfectants and cleanliness, as well as the general carrying out of the Rules of the Central Midwives Board.

Six of these midwives are unable to keep their own books and records as they cannot either read or write satisfactorily.

14 midwives were dealt with in the manner set out below :—

	No. of Midwives affected	Action Taken
Attending patients suffering from Puerperal Fever or other infectious disease.	4	Suspended from practice until bag, appliances and clothing was disinfected by Local Supervising Authority.
Breaches of rules and regulations of Central Midwives Board such as failing to notify Local Supervising Authority of sending for medical aid ; relieving tongue-tied baby with scissors ; books improperly kept ; dirty bag and scissors ; etc.	10	Four cautioned by letter—being first offence ; six cautioned personally—(previously cautioned.)

Notifications.

In accordance with the provisions of the Rules of the Central Midwives Board, 193 records of sending for medical help were forwarded to this department by midwives, particulars of which are appended.

MOTHER—	
Delayed Labour	48
Obstructed Labour	45
Adherent Placenta	17
Breech presentation	15
Ruptured perinæum	13
High temperature	7
Weakness	7
Acute partum hæmorrhage	6
Post partum hæmorrhage	4
Rigid cervix	3
Abortion	2
Dirty or Verminous patients	2
Adherent membranes	1
Placenta previa	1
Heart trouble	1
Fits	1
	173
BABY—	
Deficient vitality	8
Premature birth	6
Death of baby	3
Ophthalmia	2
Suspected dead fætus	1
	20

During the past year only nine still-births were notified under this Act. It appears that since the Notification of Births Act, 1907, came into operation, the midwives are of opinion that notification under the Rules and Regulations made under the Midwives Act is no longer necessary ; whereas, although in the 1907 Act provision is made for the notification of still-births, the obligation of the midwife to notify under the Midwives Act is not repealed thereby. This arrangement will require some readjustment for purposes of effective working and avoiding unnecessary reduplication.

The Health Visitors paid 82 visits to midwives for the purpose of examining their books, bag and appliances.

The extent of the midwifery practice in this town may be seen from the following statement regarding the births of 1909 :—

Births attended by Midwives	78·3 per cent.
,, by Medical Men	21·7 ,,

Water Supplies.

Rochdale, like so many other Lancashire towns, suffers from the lack of any good, convenient and plentiful source of water-supply. Consequently the history of providing an adequate water-supply for Rochdale has been one long arduous fight in overcoming geological and engineering difficulties, many of which were not foreseen by the most experienced and competent water-engineers, whose advice was always obtained. Thus, after an expenditure which approaches one million of money, the Water Committee, in order to increase the supply in proportion to the increasing demands of a growing and manufacturing town ; besides carrying on experimental operations by means of bore-holes and otherwise, have still to keep a watchful eye on any available natural gathering grounds.

Again, from the public health aspect, it has to be continually kept in view that most of our gathering grounds are of an upland, moorland and hilly nature ; and consequently that water from such sources frequently exhibits a plumbo-solvent action, due chiefly to the presence of acids in the water, which are again most probably due to acid-producing bacteria in the moss and decaying vegetation. There is further the erosive action of water on lead, although this only takes place to any appreciable extent when the lead is bright; and most natural waters contain ingredients which inhibit this erosive action. But, although there are these two well-understood modes of action of certain waters on lead, it has still to be recognised that the behaviour of many soft moorland waters on lead is often almost inscrutable.

Consequently the methods of observation in order to ascertain any varying conditions of the water, and the remedial measures to be adopted, as also the efficiency with which these are carried out, are all of vital importance to any community such as Rochdale and many other Lancashire and Yorkshire towns ; and it is satisfactory to note that the Water Works Committee are now having a quarterly analysis made of the water as supplied to the town, and we hope to be able in future reports to deal more fully with these analytical results, and their bearing on the health of the community ; as also the behaviour and action of the water-supply of this Borough on the different kinds of service pipes.

Cases of Suspected Lead Poisoning.

During the year two such cases came under our notice. The first was reported in the month of June by a medical man, who suspected one of his patients in the Milnrow-road district to be suffering from lead poisoning. On examination of the water-supply, which was derived from a private covered well situated a few yards behind the house, and laid on by means of lead piping ; the water was found to contain such a quantity of lead as to be injurious to health ; and further, it showed evidence of sewage pollution. The well was closed and Corporation water introduced.

The water-supply from some other private sources in this district were examined, and in some cases the owners were advised to introduce Corporation water.

The second was supposed to be a case of chronic lead poisoning, and was that of a man, who died on the 3rd November, and was living in a house in the Edenfield-road district, which is an outlying part of this Borough, and consequently the water-supply for this house and about 80 others in the same district, is derived from the reservoirs of the Heywood and Middleton Water Board.

As the poisoning in this case was supposed to have extended over a period of years, and a Coroner's inquest held, a full report on the case was submitted to this Health Authority, and also to the Local Government Board, who considered the action and preventive measures adopted by this Authority, as satisfactory.

Particulars of Specimens examined at the Public Health Laboratory, Manchester, during 3 years 1907-9.

Year	Suspected Disease.																Totals			
	Diphtheria				Enteric Fever				Tuberculosis				Other Diseases							
	Positive	Negative	Doubtful	Total	Positive	Negative	Doubtful	Total	Positive	Negative	Doubtful	Total	Positive	Negative	Doubtful	Total	Positive	Negative	Doubtful	Totals
1907	2	5	...	7	2	9	...	11	25	12	...	37	2	1	...	3	31	27	...	58
1908	2	10	...	12	8	9	1	18	9	16	...	25	...	2	1	3	19	37	2	58
1909	15	41	3	59	4	10	...	14	5	29	...	34	1	2	...	3	25	82	3	110

Municipal Bacteriological Laboratory.

According to instructions from my Committee, who expressed the desirability of instituting a Municipal Bacteriological Laboratory, a room in the Town Hall, adjacent to the Health Offices, has been obtained and all the necessary structural alterations carried out. The apparatus, which is now ready for installation will include a Leitz Stand C., oil immersion, bacteriological microscope: magnifications 29-1200. A Chamberland Autoclave, and Biological Incubators for the cultivation of micro-organisms, by Hearson & Co., London, who will also supply some of the minor apparatus.

The scope of the work in the new laboratory will include at first the examination of sputa, throat swabs, and Widal's blood tests; and will be commenced as soon as working arrangements can be made.

It may be added that this laboratory, although provided with some of the finest apparatus; yet, on the whole has been put together at a comparatively small cost.

The Disposal of Sewage.

The question of improvement in the means of disposal of the sewage of the Borough has now been under the consideration of this Council for some years; and a large scheme of extension of the present Roch Mills Sewage Disposal Works has just been prepared by the Borough Surveyor, who supplies the following note:—The estimated cost of the full scheme is £54,000, and meantime instructions have been given that application be made to the Local Government Board for sanction to borrow £31,500, this being the estimated cost of that portion of the scheme which it is intended to proceed with at once.

The method of treatment will continue to be chemical precipitation in tanks; the capacity of the tanks being increased under the new scheme; a minor portion of the volume of the tank effluent will be treated on the present land filtration plots; the major portion of the volume of the tank effluent to be treated on continuous Percolating Filters, and then passed through Humus or Deposition Tanks before being discharged into the river.

The storm water is to be screened and dealt with in special Storm Water Tanks before being discharged into the River.

The work of the Joint Committee on the conversion of the pail system to the fresh water carriage system for the disposal of sewage.

As this important question had been under consideration for many years, a Joint Committee was constituted in June, 1907, and consisted of four members of each of the following Committees : Health, Paving and Sewering, Building, and Water Works ; and the first meeting of the Joint Committee was held during September, 1907, when it was decided as an initial step to have a Report prepared as to the closet accommodation in the Borough, and the probable cost of conversion.

The next meeting was held in January, 1909, when the above report was submitted, and the Town Clerk instructed to obtain information from other Lancashire and Yorkshire towns as to the conditions prevailing in these towns with respect to closet accommodation, and as to experience and cost entailed in conversion where any such scheme had been carried out.

The next meeting was convened in June, and the above report submitted, when the Joint Committee expressed the opinion that the fresh-water carriage system should be gradually adopted, and that the Council should authorise the Committee to submit a scheme of conversion on the basis of a contribution being made in certain conditions by the Council.

This authority was readily conferred by the Council at their monthly meeting in July ; and at the next meeting of the Joint Committee in August, a scheme was prepared on the basis of the Council bearing half the cost ; and for economic reasons of working and readjustment the conversion rate should be 700 or any multiple per annum. But a difficulty here presented itself due to the high water charges for water-closets and baths ; and without going into this matter one desires here to record the hearty co-operation of the Water Works Committee in re-adjusting the water rates so as to reduce the charge on fresh-water closets by about one-half the previous charges.

A full draft report of these proceedings was then prepared by the Town Clerk, and submitted at the next meeting of the Joint Committee early in October, when some further amendments were considered and included.

On the 21st October the Joint Committee met to consider the final draft report as now amended, and resolved that the same should be submitted for approval to the Council ; and on the 28th October, the Council at their monthly meeting almost but unanimously approved and adopted the scheme.

The Scheme in brief is as follows :—

(*a*) That the Health Committee be empowered to adopt such measures as they may deem advisable to secure, in the case of houses having separate closet accommodation, the conversion into water-closets of the existing pail closets at the rate of about 700 per annum.

(*b*) That a contribution be made by the Council of half the cost of conversion, subject to the following conditions, viz. :—

- (i.) That the amount of contribution should be ascertained in such manner as the Council shall from time to time decide.
- (ii.) That application for a contribution be made to the Council and agreed to by them before the commencement of the work.
- (iii.) That the work be carried out in every respect in accordance with the requirements of the Council.

(*c*) That, so far as regards the conversion into fresh-water closets of pail closets used in common, the Health Committee be authorised to deal with the same on the merits of each case.

(*d*) That the Town Clerk be authorised to make application to the Local Government Board for sanction to a loan of such sum as may be required by the Council to cover the amount of their contributions towards the cost of converting pail closets into fresh-water closets for a period of three years.

The Local Government Board held an enquiry the following month and approved the scheme and sanctioned a loan as requested.

In reviewing the history of this conversion scheme one cannot but compliment the Joint Committee on the expiditious, business-like and conciliatory methods which they pursued in carrying their deliberations and negotiations to a successful conclusion. Each sederunt marked progress on definite lines to a definite issue ; and I can have no hesitation in saying that in days to come the work accomplished by this Committee will be of supreme importance in all matters pertaining to the health and amenities of this Borough. In my Quarterly Report, June, 1909, I ventured to summarise the salient features of the controversy of the hour which was for or against the fresh-water closet. That article is here subjoined.

> " The Town Council, at their monthly meeting on July 3rd, in resolving to accept the " recommendation of the Joint Committee, that a comprehensive and detailed scheme " should be prepared regarding the clean water carriage system, have taken what will be " considered a very important step in the advancement of a great and far-reaching Sanitary " Reform for Rochdale. As the question is being discussed from many points of view, the " moment seems opportune for considering a few of the more salient features ; as there is " often a tendency to lose sight of the forest for viewing the trees.
>
> " Should the clean water carriage system be adopted for Rochdale ? The general " sentiment of the English people, Sanitary Science, and all Health Authorities have pro- " nounced strongly in its favour, as the system of the future, and as the only system which " provides the cleanest, the readiest, and the cheapest method of removal of sewage ; and " therefore, there is in this system, something of finality.
>
> " Every Local Authority in England so far as I am aware now recognises the truth of " this statement ; and the great majority are at the present moment encouraging by various " means the introduction of this system and getting rid of all others.
>
> " No one can put back the hand of time. We live in an age of great Municipal and " Industrial progress ; and municipalities like individuals cannot stand still ; they must " either move forward in the van of progress, or irresistably fall into the rear. Such a posi- " tion for a great industrial centre like Rochdale is unthinkable.
>
> " Just as there were pioneers in Sanitation in Rochdale, when it was the first to introduce " the pail system, which was a great advance on many of the systems which preceded it, " so there are to-day in Rochdale pioneers who recognise that in seeking after the ideal, " systems must often come and go ; and that as the pail, midden and slop-water systems " have over-stayed their time, they should now disappear by a gradual process of conversion, " and give place to the fresh-water carriage system. Further, I believe time and experience " has already persuaded the great majority of citizens of the truth of this statement.
>
> " Such a scheme is basal and lays the foundation for much useful Sanitary reform ; " and, when accomplished, its beneficient influence would operate favourably on the many " complex factors which determine the condition of the Public Health, Happiness, and " Amenities of any community.
>
> " On the other hand, should Rochdale retain its present pail, slop-water and midden " systems ? Is there any evidence to support this contention ? I can only here briefly " state that I am not aware of one particle of evidence either on Scientific, Sanitary, or " Public Health grounds that could be adduced in support of this contention, if clean water " is available. All such systems allow of accumulation of filth, effluvia and excrementitious " matter in the vicinity of dwellings, and therefore violate one of the first principles of " sanitary science. For it is now axiomatic that filth is the parent of disease, and they both " lurk together.
>
> " In dealing with this matter some advise delay. But has delay made the problem any " easier of solution to-day than say ten years ago ? or would delay make for an easier solution " ten years hence ? Every pail and slop apparatus introduced to-day can only augment the

" difficulty and expense of removal at some future day ; and I may be allowed to add, that " if arrangements were now made, whereby the putting in of pails and slops should gradually " cease, while only a small yearly conversion was made on an equitable but economical " basis, Time itself would greatly aid in the solution of this problem, for I believe there are " many House Owners as well as House-holders, who would gladly avail themselves of " making the change on a reasonable basis, and thus the scheme would develop through its " own inherent merit, and by favour of contrast.

The comparative advantages and defects of the different systems—fresh-water closets and waste-water closets as found in practice, and as they affect the sanitary conditions of the town will be fully discussed in the Housing Report, which will follow at a later date.

The closet accommodation in the whole borough, as reported on the 31st March, 1910, is here set out :—

No. of Pail Closets	16,789
,, Fresh-water Closets...	2,488
,, Waste ,, ,, ...	2,471
,, Privy Middens	147

Black Smoke Abatement.

In accordance with your instructions a special report on this subject was submitted in March of this year, giving particulars of the number of manufactories concerned, and of the various kinds of smoke-consuming appliances which have been adopted in the Borough. The collection of this information necessitated about 160 visits to mills and factories working at the time, and the particulars ascertained are given below :—

No. of Manufactories having :—

(1) No smoke preventing appliances	91
(2) Only some of boilers fitted with appliances	3
(3) All boilers fitted with appliances	65
Total number of manufactories	159

The following table shows the various kinds of smoke preventing appliances in use and to what extent each kind prevails :—

140 boilers at *94 Factories have no appliances.

157	5	,,	3	,,	,,	Meldrum's Patent Furnaces.
	4	,,	2	,,	,,	induced draught { 1. Sturtevant Fan. 2. Sirocco Fan.
	1	,,	1	,,	,,	hot air admitted beyond bridge.
	4	,,	1	,,	,,	hollow bars and combustion chamber.
	6	,,	4	,,	,,	Johnson's Patent Smoke Consumer.
	64	,,	26	,,	,,	Procter's Stokers.
	20	,,	11	,,	,,	Bennis's Stokers.
	15	,,	5	,,	,,	Auto Stokers.
	13	,,	4	,,	,,	Triumph Stokers.
	9	,,	2	,,	,,	Hodgkinson's Stokers.
	7	,,	5	,,	,,	Baron & Brierley's Stokers.
	4	,,	4	,,	,,	Whittaker's Stokers.
	2	,,	1	,,	,,	Grimshaw's Smokeless Stokers.
	1	,,	1	,,	,,	Barlow's Stokers.
	1	,,	1	,,	,,	Leach's Stokers.
	1	,,	1	,,	,,	Broadbent's Steam Poker.

*Including factories where some of boilers are fitted.

The number of boilers connected with a single chimney varies considerably ; at one factory there are as many as eight; at two other factories there are six ; while at many of the other factories included in the above list there is only one small boiler to each chimney, which, owing to the very small quantity of smoke emitted will be only rarely under observation.

The recorded observations during 1909 number 262, or 27 more than during 1908. The observations are for a period of one half-hour each, and were confined to 71 of the 159 chimneys. Of these 71 chimneys, 13 were kept more regularly under observation than the rest, on account of the frequent emission of smoke; the number of observations made was 113, and varied from 14 to 6 to each chimney.

The total number of minutes during which black smoke was found to issue from the chimneys is 492, an average of nearly two minutes for each observation; but on 43 occasions the time limits fixed by the Committee were exceeded. The time limits are :—

(1) Chimneys with 1, 2 or 3 boilers working ... ... 3 minutes
(2) Chimneys with 4 or more boilers working ... ... 4 ,,

In the case of chimneys having 1, 2 or 3 boilers working the limit was exceeded 37 times; and of chimneys having 4 or more boilers working 6 times. The following Table gives particulars of the issue of black smoke from these chimneys :—

Issue of Dense Black Smoke on 43 occasions when Time Limits were exceeded.

	No. of Observations	Total Issue in Minutes	Average No. of Minutes per Observation	Average No. of Minutes per Boiler	Number of Cases in which Smoke-Preventing Appliances were—		
					In Use.	Partly in use	Not in Use.
1, 2 or 3 Boilers Working	37	204½	5·5	2·9	4	7	26
4 or more Boilers Working	6	47½	7·9	1·7	3	1	2
Both cases combined	43	252	5·9	2·5	7	8	28

In five of the above cases legal proceedings were instituted with the results shown below :—

Legal Proceedings for Abatement of Black Smoke Nuisance.

Date of Hearing	OFFENCE	RESULT
1.—Jany. 27	Emitting 6 minutes of Black Smoke in half-hour (2 boilers)	Order for abatement within six weeks and pay costs.
2.—March 19	Failing to comply with order for abatement made Nov. 4, 1908.	Fined 10/6 and costs.
3.—May 19	Emitting 4 minutes of Black Smoke in half-hour (1 boiler)	Order for abatement within six weeks and pay costs.
4.—Aug. 4	Emitting 3½ minutes of Black Smoke in half-hour (1 boiler)	Order for abatement within four weeks and pay costs.
5.—Sept. 29	Failing to comply with order for abatement made May 19.	Fined 10/6 and costs.

In the 38 remaining cases the usual notice for abatement of nuisance was served, and as a result three new boilers were fixed in two factories; and smoke preventing apparatus was provided for eight boilers, involving four factories.

As much attention as possible is being given to the observation of chimneys now under notice, and to others which are known to emit black smoke in such quantities as to be a nuisance ; and, although there is much room for improvement in this respect, it is nevertheless true that, owing to the action taken by the Committee during the last few years, the quantity of black smoke issued from the chimneys in the Borough is not so great as it once was ; and further, that the attitude of mill and factory owners appears to be one of willingness to do such work as may be reasonably expected of them to prevent an excessive issue of smoke from their chimneys. However, the large number of firms who have not yet adopted any mechanical smoke-preventing appliances at their factories, shows how necessary it is that this work be pushed on with even greater earnestness than heretofore.

Sale of Food and Drugs Acts.

212 samples of food and drugs have been taken in connection with these Acts against 193 in 1908, being an increase of 19. Of these 212 samples, 184 were formal and 28 informal. Following is a classification of the samples procured, with the results of analysis :—

DESCRIPTION	NO. PROCURED		RESULT OF ANALYSIS	
	Formal	Informal	Genuine	Adulterated
Milk	108	4	100	12
Butter	15	6	21	...
Skimmed Milk	4	...	4	...
Margarine	3	...	3	...
Pepper	3	...	3	...
Coffee	2	...	2	...
Baking Powder	2	...	2	...
Soda Water.	3	14	15	2
Glycerine	...	2	2	...
Limewater	2	2	3	1
Liquorice Powder	3	...	2	1
Camphorated Oil	2	...	2	...
Sweet Spirit of Nitre	2	...	1	1
Irish Whisky	11	...	11	...
Scotch Whisky	9	...	8	1
Rum	10	...	10	...
Gin	5	...	4	1
TOTAL	184	28	193	19

In the cases of eight slightly adulterated samples, letters of caution were forwarded to the vendors, and in regard to six other adulterated samples and for other offences under these Acts, proceedings were instituted as follows :—

Prosecutions under Food and Drugs Acts.

No.	Date of Hearing	OFFENCE	RESULT
1	1909 3 Mar.	Selling milk adulterated with 8% additional water.	Case dismissed: bench disagree.
2	16 June	Selling milk adulterated with 11% additional water.	(Two Defendants) Each fined 10/6 and costs.
3	25 Aug.	Selling milk containing only 2·4% of fat	Fine of 21/- and costs.
4	6 Oct.	Selling Soda Water containing only 1% of Bi-carbonate of Soda.	Fine of 10/6 and costs.
5	8 Dec.	Selling milk containing only 1·83% of fat.	Fine of 40/- and costs.
6	8 Dec.	Refusing to sell sample of milk to Inspector.	Fine of 10/6 and costs.
7	1910 19 Jany.	Selling milk adulterated with 14% additional water.	Fine of 10/6 and costs.
8	19 Jany.	Refusing to sell sample of milk to Inspector.	Fine of 21/- and costs.
9	19 Jany.	Do. do. do.	Case dismissed.

In connection with these cases it is difficult to avoid commenting on the inadequacy of the fines imposed in this Borough, when compared with other districts, and particularly is this so with regard to the cases of Refusal to sell to the Inspector. The ordinary offence of adulteration of food-stuffs is one which calls for heavy penalties and the punishment made to fit the crime, if any diminution of the crime is to be experienced ; but the other offence is even of a worse nature, suggesting, as it does, an attempt to cover up an offence and to mitigate the consequences. It seems curious that a man who, for instance, knowingly has in his possession and for sale milk presumably so adulterated that he refuses to supply the Inspector, should prove more difficult to convict, and when convicted, should escape with a smaller fine than the man who submits to the requirements of the law ; and the adulteration of whose milk may or may not have been done with his consent or cognisance. The frequency of these cases of Refusal to sell, as well as cases of adulteration, in this Borough, may be partly considered as the result of fines on conviction, which are not sufficient to deter the vendor, who finds the business of adulteration a very profitable one, when at the same time, even if convicted, the fine imposed does not represent any considerable percentage of the illegal profits resulting from the sale of an adulterated article of food. This is evident when we consider that 9 out of the last 13 convictions for adulteration were due to three dairymen who appeared time after time for the same offence.

Cowsheds, Dairies and Milk Supplies.

Early in the year 1909, we resolved to institute an investigation as to the conditions of Cowsheds, Dairies and Milk Supplies of this Borough ; and the results of this investigation were submitted in September in the form of a Report to the Health Committee.

This report has had a wide circulation. There have been over 600 abridged reprints, while some authorities have had reprints at their own expense ; and it has been supplied by request to many Boards of Health and Boards of Agriculture throughout the British Colonies.

The textural part of the original report, along with appendices B, C, D, form the Appendix to this report ; but Appendix A, which was one of the chief features of the original report is not reproduced. It consisted of 16 double folding sheets as shown in the specimen page, and the whole of the dairy farms in this district were tabulated under 31 headings as therein shown, with an accompanying index key.

As the whole question of Milk Supplies is discussed at great length in the report, I will only here add, that I venture to think that any one who reads this milk report will conclude that there yet remains much to be done before we can have what may be termed a reasonably pure milk-supply.

However, from our investigation we intend to introduce a new set of Regulations for the control and regulation of this trade at an early date ; and we hope to have the co-operation of both Landlords and Dairy Farmers in the observance of these Regulations.

As an introduction to measures of improvement, I was able through the kindness of the Authorities of the Agricultural College of the Lancashire County Council at Preston, to arrange for two lectures to be given in February and March of the present year by the Migratory Lecturers of the College, on subjects of interest to the Dairy Farmers in this district ; and it is very gratifying to be able to record that both meetings were highly successful. The great majority of the Dairy Farmers, as well as their assistants, attended both meetings, and showed a considerable and enquiring interest in the subjects which were under consideration.

Inspection is regularly made by the Dairies and Milk Inspector, and the defects found are such as are dealt with in the Milk Report ; while such misdemeanours as milking with dirty hands, wet milking, cows not kept properly clean, and not excluding the milk of diseased cows have frequently been reported on during the year by the Inspector ; and it is to be hoped that, under the new Regulations, we may be able to establish a higher sense of responsibility and duty on the part of Dairymen as regards their observation of the ordinary methods of cleanliness, which the public health laws demand ; and which the public expect from every self-respecting dairyman.

Meat and Food Inspection.

The work in connection with this department included the regular inspection of Butchers' Shops and Market Stalls, 103 visits to Ice Cream Manufactories, 261 visits to Chipped Potato and Fried Fish Shops, and 2,983 inspections of Slaughter-houses ; the last number including special visits made for the compilation of a report on the structural conditions of Slaughter-houses in the Borough, which is given below.

The Inspector appointed to carry out the duties of meat inspection is a full time officer who possesses the certificate of The Royal Sanitary Institute for Inspector of Meat and Other Foods ; and his duties include, in addition to the above, the inspection of Offensive Trades ; and Dairies, Cowsheds, Milkshops.

The insanitary conditions found and remedied at places where food and meat is stored or prepared are as follows :—

Storage of Food at insanitary premises	5
Defective floors to food stores	2
Defective drain at food stores	1
Effluvium nuisance from lard rendering	1
Pail-closet ventilating into fish store	1
Ice-cream making at unsuitable premises	2
Slaughter-houses—	
Requiring lime-washing	14
Improper deposit of garbage	3
Defective and absorbent walls and floors	2
Defective yard surface	1

Many of the conditions existing in such places are not all that might be desired, but, except in a very few cases, little difficulty has been experienced by the inspector in the maintenance of a reasonable standard of cleanliness. The conditions specially referring to Slaughter-houses are shown in the report below.

A large quantity of food and meat considered to be unfit for human consumption has been seized, surrendered or destroyed during the year, and it was not found necessary in any case to institute legal proceedings. The following list shows the kind and quantities of some of the food-stuffs seized or surrendered :—

The number of carcases observed to be affected with tuberculosis was seven. In two cases the whole carcase was condemned and destroyed, but in the remaining five only portions were destroyed, amounting to	1490 lbs.
Beef (excluding Tuberculosis)	69 ,,
Liver, &c.	110 ,,
Pork	624 ,,
Mutton	163 ,,
Lamb	91 ,,
Fish	— ,,
Offal	184 ,,
Vegetables	12 ,,

Slaughter Houses.

(The Data for which has been furnished by
Mr. LEE, the Meat Inspector.)

Number of Slaughter Houses.

The number of recognised slaughter-houses within the Borough is 33, five of which are registered, and for 28 of which Licenses are issued annually by the Borough Council.

Registered Slaughter Houses.

Of the Registered Slaughter-houses four are situated in the centre of the town, and have probably been occupied as Slaughter-houses from a time anterior to the Incorporation of the Borough in 1853, and have been continuously so occupied ever since. The other is situated in the Lowerplace district, which was incorporated with Rochdale by the Rochdale Extension and Improvement Act, 1872.

Of the five Registered Slaughter-houses, two have the appearance of having been built for the purpose of dwelling-houses, and of having afterwards been converted to their present use ; four of them are in close contact with dwelling-houses, being separated from them by the party wall only ; and one other, in addition to being bounded on two sides by dwelling-houses, has standing against it five pail closets on another side. This slaughter-house is entered from an enclosed yard which is covered by a glass roof. All these five slaughter-houses are situated in densely populated districts, and are closely hemmed in by other buildings.

Licensed Slaughter Houses.

Of the 28 licenses issued by the Rochdale Corporation in January last, 25 were in respect of premises regularly used for the killing and dressing of animals intended for human food ; one was issued in respect of premises then so used, but now occupied as a Joiner's Shop ; another was in respect of premises used as a Knacker's Yard ; and the remaining license was granted to a firm of Woollen Manufacturers who are also farmers, and who do not use any place regularly as a slaughter-house, but only occasionally kill a few sheep and lambs for disposal amongst the mill operatives and milk customers.

Suitability of Premises.

Many of these premises are unsuitable for the purpose of slaughter-houses ; some on account of situation and surroundings, and others on account of structural defects ; whilst there are several against which both the foregoing objections might very reasonably be urged.

Situation of Premises in relation to Dwellings.

There are 13 slaughter-houses which are built against occupied dwelling-houses, with nothing but the party wall separating the slaughter-house and the dwelling. There are three of them where there is direct communication between the slaughter-house and the dwelling ; there are five which are situated within five yards, and nine others which are not more than ten yards distant from occupied dwelling-houses. Thus 43 per cent. of the slaughter-houses are built against dwelling-houses, 60 per cent. are not more than five yards distant, and 93 per cent. are situated within a distance of ten yards from occupied dwellings.

Variety of the Buildings used.

The buildings used as slaughter-houses vary very greatly as regards their construction and suitability ; they include four sets of premises which have been specially built for the purpose, and apart from their situation are quite suitable. In all four cases they are one storey buildings with pitched roofs ; the inside walls are lined with glazed bricks, the floors are constructed of concrete, the light and ventilation is good, the drains are trapped and ventilated, there are separate lairs and cooling rooms provided to three of them, and at the other (which is occupied by a pork butcher) there is a separate room in which the cooking of the foods is done.

Amongst the others are found the low-pitched one storey building, with light and ventilation deficient ; and the lofty one-storey building with abundance of light and ventilation ; brewhouses, dwelling-houses,weaving shed, and warehouses of two and three storeys high, from which portions of the second and third floors have been partly removed to allow of light and ventilation, and where the beams and portions of the floors have been left in as supports to the building. These beams and floors harbour dust and other debris, rendering difficult the maintenance of that condition of cleanliness which is essential where the handling of meat is concerned. In each case the internal walls are constructed of soft porous bricks, and with three exceptions the floors are constructed of flags; these three have the floors concreted. In twenty-five of them the dead carcases are left hanging to cool in the same room where the slaughtering and dressing of the animals is carried on. In four of them there is no provision for keeping the live animal from the time of purchase to the time of slaughter other than inside the slaughter-house. In 19 slaughter-houses the drain inlets are inside, and 11 of them have the drain inlets placed outside the building.

Pork Butchers' Slaughter Houses.

There are 12 slaughter-houses in the occupation of pork butchers, and in which only pigs are slaughtered. Three of these are very well arranged and well equipped premises, which have been specially built for the purpose. In each of these there is separate lairage accommodation, a separate room for slaughtering, and a separate room in which to prepare the cooked foods, viz. :—polony, sausage, brawn, pies, etc. In two others, the slaughtering only is done, the carcases and offal being then taken to the shops, where all the cooking and making-up is carried out. In seven others, slaughtering and all the other processes necessary to the preparing and cooking of the various foods is carried on in the same place. These differ very greatly in the accommodation which they afford for carrying on the business, including as they do the small cramped up place of about 15ft. by 12ft., and the large roomy building of 36ft. by 15ft. In the smaller cramped building the crowding of the engine, machinery and boiling pans so closely together, makes it difficult to maintain a satisfactory state of cleanliness; while in the larger and more commodius building, opportunity is afforded for more satisfactory arrangement of machinery, and the observance of cleanliness is a comparatively easy matter.

Beef Butchers' Slaughter Houses.

There are 18 slaughter-houses in the occupation of beef butchers, and these too differ greatly in respect of the accommodation they afford, and their suitability for the purpose. In only one instance can the premises be described as quite suitable. In this there is a separate lair, slaughter-house, cooling room, and chill room (but the latter has not recently been used). The buildings are lofty, well lighted, and ventilated. The internal walls are lined with glazed bricks, the floors constructed of concrete, and the drainage in good order. This is the only slaughter-house of all those used for the slaughter of the larger animals, for which a separate cooling room is provided. In the remaining 17 the slaughtering and dressing of the animals is carried on in the same room where the dead carcases are hanging. Thirteen of them have the drain inlets inside and four have the drain inlets situated outside the building.

The following recommendations of the Local Government Board with respect to slaughter-houses might be usefully considered, and compared with the conditions which obtain in the majority of the slaughter-houses in Rochdale. The suggestions contained in them will serve as a useful guide to the lines on which improvements should be effected.

1.—The premises to be erected or to be used and occupied as a slaughter-house should not be within 100 feet of any dwelling-house, and the site should be such as to admit of free ventilation by direct communication with the external air on two sides at least of the slaughter-house.

2.—Lairs for cattle in connection with the slaughter-house should not be within 100 feet of a dwelling-house.

3.—The slaughter-house should not in any part be below the surface of the adjoining ground.

4.—The approach to the slaughter-house should not be on an incline of more than one-in-four, and should not be through any dwelling-house or shop.

5.—No room or loft should be constructed over the slaughter-house.

6.—The slaughter-house should be provided with an adequate tank or other proper receptacle for water, so placed that the bottom shall not be less than six feet above the level of the floor of the slaughter-house.

7.—The slaughter-house should be provided with means of thorough ventilation.

8.—The slaughter-house should be well paved with asphalt or concrete, and laid with proper slope and channel towards the gully, which should be properly trapped and covered with a grating, the bars of which should be not more than three-eighths of an inch apart.

9.—Provision for the effectual drainage of the slaughter-house should also be made.

The surface of the walls in the interior of the slaughter-house should be covered with hard, smooth, impervious material, to a sufficient height.

10.—No water-closet, privy, or cesspool should be constructed within the slaughter-house.

There should be no direct communication between the slaughter-house and any stable, water-closet, privy, or cesspool.

11.—Every lair for cattle in connection with the slaughter-house should be properly paved, drained and ventilated. No habitable room should be constructed over any lair.

From a brief study of this report on Slaughter Houses one can come to no other conclusion than that, if we are to aim at the systematic inspection of every carcase of dead meat which is to be used for human food, and which is the only satisfactory method, instead of the partial detective system which we pursue at present, it will be necessary to consider the advisability of the provision of a Municipal Abattoir.

The conditions as here represented make it impossible for this Health Authority to exercise any adequate supervision or inspection of the great bulk of the meat which is being brought in and sold as human food in this district.

Offensive Trades.

The number of premises in which offensive trades are carried on within the Borough is 10 :—

Tripe Boilers	5
Gut Scrapers	1
Fellmongers	2
Tallow Melters	1
Knacker's Yard	1

These premises have been regularly visited during the year, especially during hot weather, when nuisance was most likely to occur in connection with them. The number of inspections so made was 246 ; and in every case except two, the premises were found to be in a fairly satisfactory condition.

The two exceptions were premises in which the business of Gut Scraping is carried on ; and premises which are used for the purpose of a Knacker's Yard.

The place used for the purpose of Gut Scraping is a temporary wooden building erected on a refuse heap or tip.

At this place there is no suitable provision for clarifying the waste liquids produced in connection with the processes ; neither is there suitable arrangement made for the destruction of the offensive matter scraped from the gut ; the practice being to bury the scrapings close to the works.

With respect to the Knacker's Yard several complaints have been made during the year of nuisance arising from the process carried on : viz. :—the slaughtering of animals, the boiling of flesh of animals (which are sometimes in an advanced state of decomposition), the boiling and crushing of bones and the manufacture of artificial manure from blood and waste products of the carcases.

The chief cause of nuisance to the neighbourhood arises from the low-lying situation of the premises, which are built on the bank of the River Roch, and from the fact that the offensive vapours are carried to the houses in the immediate neighbourhood, which are situated at a much higher level.

The premises used are an old woollen mill and apart from their situation are reasonably suitable for the purpose.

Factory and Workshops Acts.

Retail Bakehouses.

The number of bakehouses now on the Register is 187. Each of these has been visited, and inspected at least twice—once in April and once in October ; further visits depending on the necessities of each case. If a bakehouse has been found on the first visit in each of the two months to have been recently limewashed and cleansed, no further inspection for the half-year has taken place ; but where such was not found to have been the case, or where superintendence of structural alterations was necessary, subsequent inspections were made until the work was completed. Following is a list of work done in connection with Retail Bakehouses :—

Number of Inspections of Retail Bakehouses	540
Cleansing & Limewashing carried out on intimation from Inspector	184
Walls repaired	2
Wall-paper stripped off	2
Ceilings underdrawn	2
Ventilator provided	1
Internal drains removed	2
Waste-pipe trapped	1

Many of the bakehouses are small and of bad design, particularly some of those in which only members of one family are employed, but no difficulty has been experienced in maintaining a reasonable standard of cleanliness. The limewashing, and in the case of painted surfaces, the cleaning down, of walls and ceilings have been carried out by the occupiers on intimation from an Inspector, and it has not been necessary to serve a single statutory notice in respect of such work.

Workshops.

202 inspections of workshops (distinguished from workshop bakehouses) have been carried out during the year, about 50 of the visits being made for the primary purpose of re-measurement of old workshops, where enlargements or alterations have taken place during the last few years ; and the measurement of new workshops notified during 1908-9.

With the exception of the proper provision of sanitary conveniences for the employees, the general conditions at the workshops are fairly good in most cases, and proper attention is paid to the allowance of sufficient air-space per head, and to cleanliness. The most usual breach of regulations was found to be the failure to exhibit in a conspicuous position, as required by the Factory and Workshops Act, the abstract of the Act relating to the particular kind of workshop and to the employment of women and young persons. These breaches of the regulations were immediately reported to H.M. Inspector of Factories.

One workroom was found to be occupied in contravention of Section 24 of the Public Health Acts Amendment, 1890, which provides that any portion of a room extending immediately over any privy (not being a water-closet or earth closet) or immediately over any cesspool, midden or ashpit, shall not be occupied as a workroom.

The premises were immediately put out of occupation on receipt of notice from the Sanitary Authority.

Following is a list of work carried out in connection with workshops :—

No. of Inspections of workshops	202
Workshops cleansed and limewashed	18
,, illegally occupied—closed	1
,, premises repaired	1
,, closet provided	1
,, water-closet reconstructed	1
,, urinal provided	1

Factories.

Several complaints, referring chiefly to sanitary accommodation at factories within the Borough, were received from H.M. Inspector of Factories, and in each case the cause of complaint was enquired into, and where possible, removed immediately. Works in connection with some of these complaints are now in progress and are reported in the table appended as " In hand at end of year." Reports of action taken in respect of these complaints have been duly sent to H.M. Inspector of Factories, as the remedial work has been completed.

Home Work.

Seven inspections of out-workers' premises have been made during 1909. In one case arrangements were made for the immediate discontinuance of the altering and repairing of wearing apparel at one of the out-workers' homes, owing to the filthiness and unwholesomeness of the premises. In the other cases the conditions were found to be satisfactory. The work in connection with the Factory and Workshops Acts is summarised below :—

Administration of the Factory and Workshops Act, 1901.

1.—INSPECTION.

Number of Inspections of Factories	7
,, ,, Workshops and Workplaces	742
Total	749

2.—DEFECTS FOUND AND REMEDIED.

Want of cleanliness		202
,, ventilation		1
,, light		0
Overcrowding		0
Other nuisances		9
Sanitary accommodation	insufficient	1
	unsuitable or defective	7
	not separate for sexes	4
Giving out work to be done on unwholesome premises		1
	Total ...	225

3.—OTHER MATTERS.

Matters notified to H.M. Inspector of Factories :—

Failure to affix abstract of Factory and Workshop Act (S. 133)		21
Action taken in matters referred by H.M. Inspectors as remediable under the Public Health Acts, but not under the Factory Act ...	Notified by H.M. Inspectors	17
	Reports of action taken sent to H.M. Inspectors	9
	No action taken	0
	In hand at end of year ...	8

Underground Bakehouses (S. 101).

Certificates granted during the year	0
In use at end of year	9

4.—HOME WORK.

Outworker's Lists (S. 107).

Nature of Work.	Lists received from Employers.				No. of Addresses of Outworkers		No. of Inspections of Outworkers Premises
	Twice per year		Once per year		received from other Councils	forwarded to other Councils	
	Lists	Out-workers	Lists	Out-workers			
Making, etc., of Wearing Apparel.	2	6	1	1	...	5	7

Rochdale Improvement Act.

Under this Act 22 houses were certified as unfit for human habitation. All these were unoccupied at the time, and were in a generally decrepit condition. The action of closing was taken in order that the dwellings might not again be occupied without the consent of the Council, many of the dwellings having been closed for a number of years, but not having been formally condemned by an Order of the Council. The following is a table of the dwellings under consideration :—

Ward	Date of Order of Council	No. of Houses	Situation of Premises
Wardleworth East	6th Jan. 1910	4	Nos. 8 to 16, Deal Court.
		2	Nos. 1 & 3, in No. 1 Court James-street.
Wardleworth South	,,	1	No. 1, off Robert-street.
	,,	1	No. 8, Pagan-street.
	,,	4	Nos. 1 to 7, Garden-lane.
	,,	3	No. 1 Court Clarke's-place.
Castleton North	,,	2	No. 2 Court Back Drake-street.
	,,	1	No. 37, Newbold-street.
Castleton South	,,	4	No. 8, Lark-street ; No. 63, Well-i'th'-lane ; Nos. 9 and 11, Back-o'th'-Barn.

Some of the houses closed under this Act in previous years were demolished by the owners in 1909, in order to improve surrounding property, and in the case of another house closed in the same way in 1901, the Order was withdrawn owing to the dwelling being repaired to the satisfaction of the Medical Officer of Health.

Housing and Town Planning Act, and Housing of the Working Classes Acts.

As an indication of the increasing interest which is now being taken in the housing of the people as a fundamental question of public health policy, by all progressive health authorities, and the Health Authority of this Borough ; a report has been prepared by the instructions of my Committee on the general housing conditions of this Borough, and will be submitted at an early date. Pending the consideration of this report, no important action has as yet been taken under these Acts, but it is expected that the large amount of material furnished in this Report will be of great service in the consideration of any scheme which may be contemplated in the future.

Improvement of Insanitary Dwellings.

In addition to the number of insanitary conditions in and around dwellings, which have been dealt with and remedied by notices served on owners and occupiers, much good work has resulted from consulting with and advising owners of property with regard to its improvement. In this way 46 back-to-back houses have been converted into 23 through houses, three old dwellings have been demolished, and other work carried out as shown opposite :—

Statement of Improvements to Insanitary Properties carried out in consultation with Owners during 1909.

Ward	Situation	No. of Houses	Summary of Defects	Remedial Measures adopted	Remarks
W'th West	19, Wilson-street 21, Wilson street	2	Back-to-back; ventilation bad; plaster of walls and ceilings in dilapidated condition; floor flagging defective; some of windows unopenable; woodwork and fittings defective; front wall damp; drain inlet defective; slopstone defective.	Four back-to-back houses made into two through houses; all windows made to open and ventilation improved; plaster of walls and ceilings reinstated where necessary; floor flagging repaired; new slopstones provided at back; front drains abolished; rear drains repaired; cellar areas filled-in; inside fittings renewed; external walls repaired and brickwork pointed in sand and cement.	Other dwellings in same block to be treated in same way.
W'th West	3, Wilkinson's-court 1, Wilkinson's-court	2	Back-to-back, and defects as above; also continuously filthy cellar areas and defective lengths of waste pipe falling to defective drain inlets in area.		
W'th East	10, Ogden-street 1, in No. 1 Court, Ogden-street	2	Back-to-back; rear cottage in No. 1 Court in a dilapidated and dirty condition, and having light obstructed by unoccupied cottage in same court.	Two back-to-back houses made into one through house; premises overhauled and done through; cottage No. 2 in No. 1 Court demolished to improve light of dwelling, and site flagged.	Cottage No. 2 in No. 2 Court Ogden Street, was previously closed as unfit for human habitation.
W'th East	10, 12, & 14, Lomax-street	3	Dwellings without back doors; closets to same in continual state of disrepair and situated against wall of one of dwellings.	Back door leading to common yard provided for each dwelling. Group of closets demolished and other closets provided in better situation. Small cottage in yard taken down to provide site for closets.	
W'th West	1A, Wilson-street 2 in No. 1 Court, Whitehall-street	2	Back-to-back; court small; cottage in court in dirty condition and generally out of repair.	Two back-to-back houses made into one through house; dwelling repaired and rooms done through.	Two other houses in the same block to be treated in same way.
W'th East	15, & 17, South-lane	2	Back-to-back; ventilation bad; plaster of walls and ceilings in very bad condition; bedroom ceilings wet owing to a defective roof; windows defective and unopenable; floor flagging defective and unlevel; closets in bad repair and dirty.	Four back-to-back houses made into two through houses; the roofs overhauled and made weather-tight; floors re-flagged or concreted; woodwork and fittings renewed or repaired where necessary; sash windows provided; washing set boilers fixed in kitchens and both dwellings painted internally and papered; No. 15 provided with separate yard and a closet on the water-carriage system; other closets cleansed and repaired.	No. 3 in No. 3 Court was previously closed as unfit for human habitation, closing order was withdrawn on the 19th November, 1909.
W'th East	2 & 3, in No. 3 Court, South-lane	2	Ditto. Also No. 3 unoccupied, open to the public and containing offensive accumulations.		

Ward	Situation.	No. of Houses	Summary of Defects	Remedial Measures adopted	Remarks
C'ton So'th	122 to 144, Vine-place	12	All back-to-back; ventilation bad; most of windows unopenable for ventilation purposes; premises in generally dilapidated condition; brickwork requiring pointing and repairing; plaster of walls and ceilings perished and defective; woodwork and fittings old and defective; insufficient and unsuitable closet and ashplace accommodation; drains defective.	26 back-to-back houses made into 13 through houses; premises thoroughly overhauled and repaired; brickwork pointed; roofs reinstated where necessary; houses cleansed, painted and papered, etc.; 5 houses provided with separate yards; common yard for 6 houses enclosed; water-closet and dry ashplace provided for each house; drains reconstructed.	
C'ton So'th	6 to 18, Ashfield-rd. and 64 to 76, Back Ashfield-rd.	14			
C'ton East	6, Back Oldham-road and No. 2, Scholes'-yard	2	Back-to-back.	Two back-to-back houses made into one through house.	
C'ton So'th	78, Milkstone-road, 1, in No. 2 Court, Milkstone-rd	2	Back-to-back; ventilation bad; back cottage in dirty and decrepit condition; common yard, small and enclosed by buildings.	Two back-to-back houses made into one through house and premises done through; two disused dwellings in yard demolished, and site flagged.	Nos. 1, 3 & 4, in No. 2 Court previously closed as unfit for human-habitation.
Spot. East	5 and 7, Woolfenden-place, and 6 and 8, in No. 1 Court, Spring Gardens	4	Back-to-back; ventilation bad; rear cottages badly lighted; premises out of repair and dirty.	Four back-to-back houses made into two through houses; premises repaired and done through.	

Nuisances under Public Health Acts.

The work under this section connected with abatement of nuisances in and around dwellings as distinguished from the remedying of defects found in Bakehouses, Workshops, Slaughter-houses, Cowsheds, Ice-cream Manufactories, etc., and of nuisances from Black Smoke, has been considerable. Besides the usual district inspection, and the house-to-house inspections of the worst portions of each district carried on by members of the staff, and resulting in the abatement of a large number of nuisances, many complaints from persons outside the department have been dealt with. The number of complaints so received was 242, and in each case the premises have been visited and reported on, and the defects found remedied in the usual way. In addition to the inspection of houses and of miscellaneous inspections (numbering about 3,000) the following work has been necessitated :—

Work in connection with Nuisances.

NATURE OF INSPECTIONS, ETC.	No.
Inspections of Work in progress	499
Re-inspections to ascertain if work in progress	1,960
Owners interviewed concerning nuisances	471
Occupiers interviewed concerning nuisances	436
Preliminary Notices sent out	629
Statutory Notices served	99
Drains tested (130 found defective)	242

The miscellaneous inspections include :—26 visits to Furnished Rooms made in the first two quarters of the year, prior to the work being transferred to another department; 221 inspections of waste-water closets; 36 inspections with regard to overcrowding; and 177 house-to-house inspections.

Following is a classified list of the nuisances dealt with :—

Statement of the Removal of Nuisances in and around Dwellings.

NATURE OF WORK DONE	NO.
HOUSES—	
Houses limewashed and cleansed	97
,, repaired —walls and ceilings	44
,, ,, —floors	25
,, ,, —roofs	29
,, rendered dry—walls and ceilings	64
Light and Ventilation improved	30
Water removed from cellars	8
Cases of overcrowding remedied	13
ACCUMULATIONS—	
Offensive Accumulations removed	27
Stagnant Water removed	8
Cellar Areas cleansed	24
CLOSETS—	
Midden-privies converted to water-closets and dry ash-places	35
Pail-closets converted into water-closets	7
,, repaired or altered	93
,, urine guides fixed	33
Closets cleansed and limewashed	155
Additional water-closets provided	4
Water-closets repaired or altered	8
,, cleansed	7
,, new, to replace old pan water-closet	1
Waste water-closets repaired or altered	27
,, ,, opened and cleansed	14
ASHPLACES—	
Additional ashplaces or ashbins provided	16
Ashplace floors raised and flagged	10
Ashplaces repaired or reconstructed	99
DRAINS—	
Drains reconstructed	158
,, connected to main sewer	1
,, efficiently trapped	2
,, provided with ventilating shafts	20
,, ,, access chambers	24
,, repaired only	91
,, opened and cleansed	139
,, inside buildings abolished	14
Cellar drains repaired or reconstructed	1
,, removed to areas	4
WASTE-PIPES, ETC.—	
Bath and lavatory waste-pipes repaired or disconnected from drains	5
Rain-water pipes repaired or renewed	41
,, ,, disconnected from drains	30
Eavestroughing repaired or renewed	32
Kitchen waste-pipes disconnected from drains	24
,, ,, trapped, lengthened or repaired	84
YARDS AND PASSAGES—	
Back yards paved or flagged	3
,, surfaces repaired or repaved	28
,, cleansed	3
Common yards flagged, paved or channelled	6
,, cleansed	3
,, surfaces repaired	11
Passages repaired, reflagged or repaved	3
,, cleansed	4
ANIMALS. EFFLUVIA. STABLES—	
Removals of animals and fowls improperly kept	9
Effluvium nuisances near dwellings abated	3
Stable floors repaired	1
Proper drainage for stables provided	2
Manure pits repaired or reconstructed	7
,, cleansed	14
,, additional, provided	2

Owing to the employment of a portion of the sanitary staff who are responsible for the work of abatement of nuisances, on special work in connection with Cowsheds and Dairies, and in connection with the Housing Report, the actual number of general nuisances dealt with is considerably lower than that of 1908; but the quality and value of the work carried out is, on the whole, highly satisfactory; while the special work is of such a nature as to influence considerably the value of the work to be carried out in future years.

Infectious Diseases.

187 cases of Infectious Disease have been taken to Marland Hospital by the Removal Officers, whilst 180 other cases were isolated at home. On each occasion a schedule containing information relating to sanitary conditions at the homes, the name of the person supplying milk to the family, and the probable source of infection, as well as particulars of persons in contact, and of other members of the family, was made up by an Inspector who specially inspected each of the homes. These, and subsequent inspections where cases were isolated at home, necessitated 537 visits during the year. The following table classifies the cases dealt with :—

Disease	Removed to Hospital	Isolated at Home	Total
Scarlet Fever	135	66	201
Diphtheria	41	43	84
Enteric Fever	11	7	18
Erysipelas	...	60	60
Puerperal Fever ...	...	4	4
TOTALS	187	180	367

Disinfection.

The total number of rooms which were disinfected by fumigation and spraying was 504; 179 of these were at dwellings in which Phthisis had occurred and where death of or change of residence by the patient had taken place, and the remaining 325 were at dwellings from which patients had been removed to hospital, or had been isolated at home and recovered or died.

The total number of articles disinfected by means of the Steam Disinfector or otherwise, the number of articles destroyed by permission, and the number of rooms fumigated, etc., are shewn below :—

Work of Disinfection.

ARTICLES PASSED THROUGH STEAM AND HOT AIR DISINFECTOR :—

Mattresses	54
Beds	348
Bolsters, Pillows and Cases	1,169
Sheets and Quilts	679
Blankets	521
Underclothing	253
Shawls, Bodices and Skirts	98
Carpets and Rugs	32
Miscellaneous articles	263
	3,417
Midwives' Appliances specially treated	4
Bedding, etc., destroyed with consent of owners	264
	268

Rooms fumigated or sprayed—

After Phthisis	179
After Other Infectious Diseases	325
	504

The following Schools have also been both sprayed and fumigated in consequence of the occurrence of Infectious Disease :—

H.R. Council School	4	rooms
B. Council School	21	,,
D.B. Private School	4	,,

Canal Boats Acts.

54 inspections of Canal Boats have been made during the year. All the boats were found to comply with the Acts and Regulations.

EDUCATION COMMITTEE.

REPORT

ON

The Medical Inspection of School Children.

To the Chairman and Members of the Education Committee of the County Borough of Rochdale.

LADIES AND GENTLEMEN,

I have the honour to submit to you and to the Board of Education, the Report on the Medical Inspection of school children for the year 1909. This Report has been prepared by Dr. MacMaster, who has given considerable attention and study to this work; and at the meetings of the Sanitary Congress, at Leeds, in July, read an interesting paper on the organisation and routine work of Medical Inspection in a County Borough, which paper was a résumé of the system in operation in Rochdale.

It is probably, as yet, too soon to attempt to appraise the actual and prospective value which is to be put on this, the newest departure in educational and public health work. But one cannot conceive that, if the children of the nation and thereby the race, are to derive the maximum good from this work, we cannot go on indefinitely merely chronicling defects found in the children and the schools. In this Report, it is gratifying to find that there is evidence of a marked improvement in the cleanliness of the children. But, if we are to mark progress, we have yet to devise such adequate means as will not only remedy these defects as far as possible when found, but, with a greater show of reason, by the more thorough application of the principles of preventive medicine, prevent as far as possible their recurrence in future. With these preventive measures we are persuaded that the teaching of Hygiene should find a place in every school curriculum, and every child taught the simple lessons of ordinary personal and domestic Hygiene; and that this should form the basis on which our future procedure should be founded. For it is neither beneficial to the child nor the parents, nor economical to the State, to provide curative treatment for dirty children, or dental treatment for decayed teeth, or any other form of active treatment; while the homes remain infectiously dirty, and no knowledge of the importance of, or interest taken in the preservation of the teeth, and in the prevention of so many other defects found in children, many of which are often readily prevented but not so readily cured. At the same time, while the State provides for the Medical Inspection of the children; and while it is the duty of Health Authorities to endeavour to provide the best hygienic conditions for the people, it is also equally necessary to secure that such conditions, when provided, shall be respected; and also the consistent maintenance of a reasonable parental responsibility; for the too easy transference of the latter on to the State is not for the best interests of either parent or child. Such defects as are being revealed by medical inspection are just such as we might have expected, in so far as we have failed to recognise that the great underlying principle of all real education is the development of a sound mind in a sound body; and with the slight remodelling of the curriculum as above suggested, we would venture to point out, that however much boys and girls in after years as men and women, and as work-people, may become interchangeable in the office, the shop, the factory and workshop, either through preference or the exigencies of circumstances; yet the education of each sex should remain sufficiently differentiated, so that each may attain in their respective states of manhood and womanhood the highest degree of health and efficiency, and a useful knowledge of the essential duties and responsibilities pertaining thereto.

It is in this respect especially, we are convinced, that the education of girls is deficient, and lamentably fails in the purpose for which it is intended. For, if not, the question arises, after nearly half a century of public health administration and compulsory education, which more recently became free, how has it come to pass that in so many homes do we find so little knowledge as regards clothing, sewing, cooking and other domestic matters; how few seem to understand that the most nutritious foodstuffs are the cheapest when cooked; that babies will not thrive on tinned lobster, which is expensive, but will thrive on oatmeal porridge and milk, which lays a good physical foundation and is the cheapest; and who does not recognise that in the home of every working man such knowledge is of vital importance, and the lack of which one of the chief causes not only of our high infantile mortality, but also the reason why there so many underfed children in school.

While the simple lessons of hygiene and physical culture are equally good for both boys and girls; it will probably be found in practice that the more specific education which will confer the greatest benefits on the great majority of boys, should be more objective in character, and which may be attained by combining the training of the mind and senses with the use of the hands, by more practical and manual instruction in the schoolroom and workshop; and thereby aim at producing healthy, useful, working citizens, who have been taught to recognise the dignity of labour by being taught to do something. On the other hand the more specific education of the girl should lie on a different plane and have a different objective, if she is to be fitted to discharge what must always be considered her primary duties in life—the management of the home.

This should include not only hygiene and physical culture, but a thorough grounding in all matters of domestic economy, and such objects as sewing and cooking; and further, that such subjects be taught with some correlation to the station in life of the pupils.

Against this it may be urged that the attainment of such training is not possible during the short school-life of the majority of girls. To this we readily agree, and consequently there is the greater need that the work begun in school should be continued by means of supplementary or continuation classes.

In this Report the subject of improved ventilation is dealt with and there is an accompanying plan of school buildings, in which the natural system of cross ventilation is secured. In these days when the virtues of open-air schools and open-air treatment are being so fully recognised; it is of equal and even greater importance that the ventilation and lighting of our schools should be on the principle which has been proved most efficient in practice; and in this respect it will usually be found that the simplest and most natural system is the most efficient.

Consequently we are of opinion that for the new schools of the Borough some consideration should be given regarding the adoption of this old principle of natural cross ventilation on an improved pavilion system.

The subject of open-air schools is also passed under review. These are now established in many towns for the benefit of children suffering from Rickets; Tuberculosis; Mal-nutrition and other infirmities; and it may be said that if such children are to have any chance in the struggle for existence, some such provision must be made for them. But, however humane and valuable such institutions are, we must still keep in view the greater ideal, that prevention is better than cure; and that Rickets and Tuberculosis are eminently preventable, although not so readily curable except in the early stage of the disease. Hence the creation of such institutions, while they offer and combine the best conditions for the curative treatment and education of such pupils, can do little for the prevention of these conditions and diseases which they try to cure. For the sufferers of the present generation they are required, but we have also to guard that their creation does not tend in future to increase the supply of such pupils, whose defects and numbers it must be our aim by the wider knowledge and application of preventive measures to diminish. Rickets undoubtedly is a disease in this as in many other towns far too prevalent, and it ought not to be so. Children are not born into the world with Rickets. It is a disease almost entirely due to improper feeding and the want of fresh-air and sunlight.

In this respect, in Section I. reference has been made to the excellent work done by the Crippled Children's Union, and its active executive officers; and while Pulmonary Tuberculosis has been discussed at considerable length in the General Report and Milk Report, the special forms of Tuberculosis in children has been frequently referred to in both Reports.

The more one studies these problems the more one is convinced that there is not one, but several of the great departments of the public service concerned; and we believe the time is at hand when it will be found necessary that at least such departments as Education, Health, and Poor-law, should be so organised and co-ordinated together as to secure more harmonious working, while at the same time greater efficiency and much greater economy would be simultaneously secured.

I have the honour to be,
Gentlemen,
Your obedient Servant,

A. G. Anderson

Medical Officer of Health.

Town Hall, Rochdale,
July, 1910.

Index.

PAGES

Section A.

General Hygienic Conditions of the School Buildings... 1

Section B.

General Arrangements and Organization 9

Section C.

General Survey of the Scope of the Work 10

Section D.

Physical conditions found 13

Section E.

Methods of Treatment adopted 31

Section F.

Treatment of Infectious Diseases 38

Section G.

Teachers examined 39

Section H.

CONCLUSIONS AND RECOMMENDATIONS. 39

PAGE
Building, Types of 2
Cleanliness of Children 19
,, Premises 8
Clothing and Footwear 18
Deformities 30
Ears and Hearing 25
External Eye Diseases 24
Heart and Circulation 27
Heating Arrangements 4
Heights—
  School Averages 13
  Borough Averages 14
  " Collective " Figures 16
Infectious Diseases—
  Inspection Results 30
  School aspect 38
Lighting 6
Lungs 28
Mental Condition 26
Nervous System 28
Nose and Throat 22
  Adenoids 23
  Glands 23
  Tonsils 22
PAGE
Number examined 12
Nutrition 18
Organization 9
Principle of Selection 11
Recommendations 39
Rickets 29
Sanitation 7
School Yard 1
Speech 26
Skin Diseases 19
Teachers Examined 39
Teeth 21
Treatment—
  Defective Eyesight 35
  General 25
  Preventive 24
School Nurses 34
Tuberculosis 28
Ventilation 4
Vision 24
  ,, Defects Treated 35
Weights 14

LADIES AND GENTLEMEN,

This report is the second annual one prepared on the work done in this Borough under the requirements of the Education (Administrative Provisions) Act, 1907, and in accordance with the subsequent articles of the Codes issued by the Board of Education.

In the first report it was only possible to deal with the results of Medical Inspection in a few schools, as the necessary arrangements for the initiation of the work were only made during the autumn of 1908, and the actual inspection carried out during the last six school weeks of that year.

In the year 1909, all the schools in the area have been visited and it is therefore now possible to present a more detailed account of many of the subjects grouped under the term, School Hygiene, together with a fuller discussion of the physical condition of the children inspected. Owing to the fact that the annual report relates to the calendar year, it includes work carried out, partly under the Code for 1908-09 and partly under that for 1909-10.

Before considering the specific sections dealt with in the work of medical inspection, the following general facts relating to the Borough as a whole claim due attention :—

POPULATION.—In the middle of 1909 the estimated population of the Borough was 89,654, while the " school period " (5—15 years) population was reckoned to be 16,487. The last official school attendance return shows that there were 14,427 children on the registers at the end of 1909, of whom 1,343 were between three and five years of age, while 13,084 were between five and fifteen, those in average attendance in these two age groups being 754 and 11,474 respectively—a total in average attendance of 12,228 children. Of the 3,403 children in the estimated "school period" population in excess of those on the elementary school registers, a proportion attend other public or private schools, while the remainder have exchanged school for work as " full-timers " on reaching the age of 13 or 14 years.

SCHOOLS.—The children are provided for in 31 schools, which have 51 departments, and are accommodated in 34 buildings. Of the 31 schools, 26 are situated within the old borough boundary, 13 on the north side and 13 on the south side of the river, while 5 meet the requirements of Castleton Moor Ward. One of the 31 schools is a higher elementary school.

A scrutiny of the distribution of the schools with reference to the density of the population shows that 13 schools are built in the most thickly populated parts of the town, 12 schools are more on the outskirts and in touch with the country, but at the same time drawing their children from the populated districts, 4 schools are in Castleton and correspond to those on the outskirts, while 2 schools are on the county boundaries, supplying scattered districts.

SECTION A.

The General Hygienic Conditions of the School Buildings.

The school yard.

The general surroundings as to population have been indicated above and the more immediate enclosure requires further consideration.

THE SIZE.—In only one old school is this too small for the number of children accommodated, all the other school premises have yards of proportionate dimensions.

THE YARD SURFACE.—In the majority of the schools the yards are in a satisfactory condition, having their surfaces covered with suitable impervious material (such as asphalt, concrete, etc.) and being provided with adequate drainage. There are a few schools, however, where the yard surfaces are unsuitable, owing to their construction being of clay, covered either with cinders or fine gravel, both of which conditions are at times associated with inadequate surface drainage. Such unsuitable conditions are not conducive to the maintenance of proper cleanliness inside the school premises, because, first, more dust and soil are carried into the school on the children's boots and clothing, and second, in summer, when the yard surface is dry and very dusty, an excessive quantity of dust is blown into the building through the windows, ventilators and doors. Seeing that an unavoidable quantity of dust is produced in school by the routine work, the prevention of all unnecessary accumulations thereof from these external causes is clearly indicated.

The " clay " yard surface proves undesirable in another direction, namely, it reduces the opportunities which the teacher has of giving out-door lessons, and of taking the children for drill and physical exercises in the open air.

Therefore, in preparing plans for a new school, the suitability of the school yard surface requires equal consideration with the sanitary conveniences, as both have an important bearing on the physique of the children and their training in matters of personal hygiene.

The type of building.

In the older schools there is much variety in the type and arrangement, and the absence of a separate room, for assembly purposes, restricts the grouping of the children for special work.

In schools recently erected the central hall type has been followed, in both the infant and mixed departments. The classes are accommodated in separate rooms, while the central hall is used for assembly, drill, or other special work, and only when the accommodation of the department is over-taxed is a fixed class taught in the central hall. One of the drawbacks in the central hall type of building is the fact that the class-rooms opening off it are restricted in cross-ventilation, and as this defect has been corrected in the pavilion type of building which has been introduced recently into certain districts in England, this new type merits a short description.

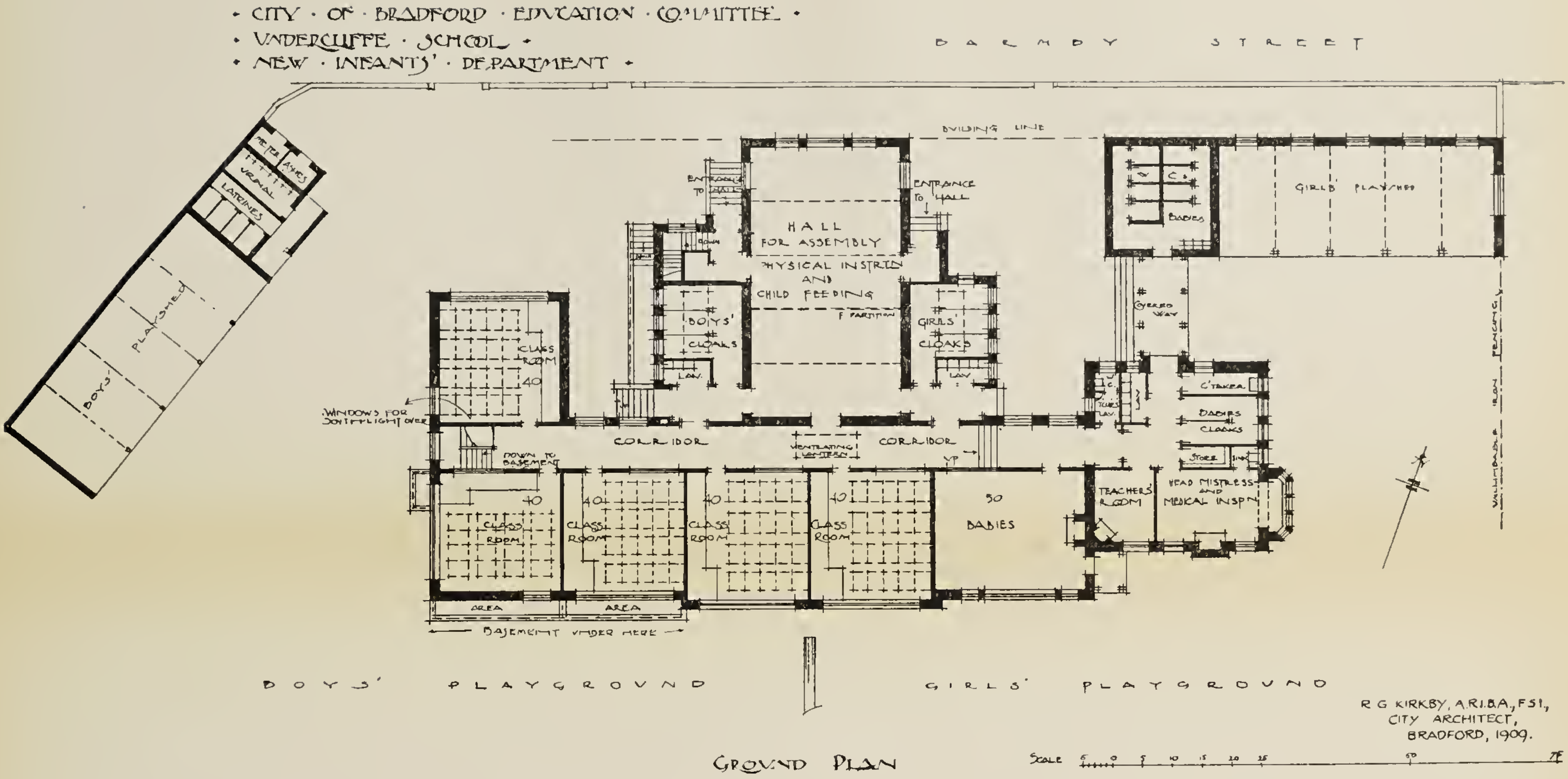
The pavilion type of elementary school.

It was in Staffordshire that these buildings were first designed, with the primary object of securing such cross or through ventilation in each room that, the vitiated air from no other room should gain an entrance therein. This was carried out by means of ventilators on two opposite sides of the room, opening directly into the open air, and the connecting of the class-rooms by verandahs.

In some Derbyshire schools the principle was next adopted with certain modifications in detail, and more recently in Bradford it has been still further extended and amplified so as to meet the requirements of buildings in higher altitudes, which are exposed to driving winds and rain.

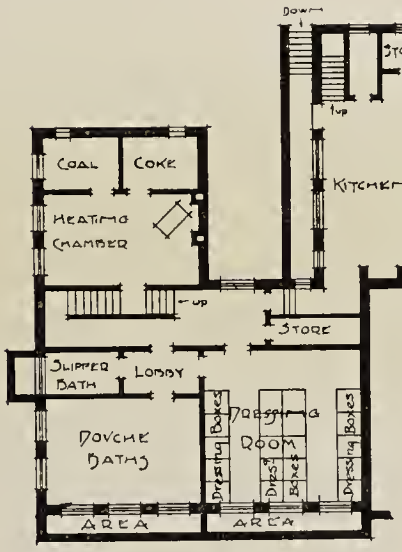
As this modified pavilion type of school building has advantages over the central hall one, in regard to the special cross-ventilation principle, the distribution of the rooms, the construction of the windows and the provision of space for spray baths, illustrations thereof, are reproduced. These are from the plans of a new school recently erected by the city of Bradford Education Committee, and I am much indebted to Mr. R. G. Kirkby, the City Architect, for the use of his drawings and the blocks of these sketches.

Sketch I.

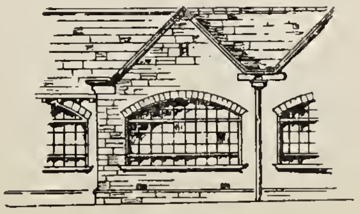


GROUND PLAN

Sketch II.

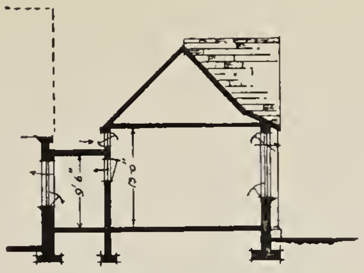


· BASEMENT · PLAN ·



ELEVATION

SHOWING LARGE WINDOWS



· SECTION ·

SHEWING CROSS · VENTILATION

10 5 0 10 20 30 40 50 60 70 FEET

R. G. KIRKBY, A.R.I.B.A., F.S.I.,
CITY ARCHITECT,
BRADFORD 1909

Sketch I. shows the " ground plan " of such a school from which the general distribution of the class-rooms and the fresh air corridor will be seen.

Sketch II. illustrates, (1) a " section " through a classroom which shows the principle of cross ventilation both into the fresh air corridor and directly into the open air ; (2) the " elevation " of the building showing large window ; and (3) the " basement plan " depicting how the space can be utilised for fitting up douche baths on the school premises.

Your Medical Officer considers the principle underlying the construction of the pavilion type of elementary school superior to that of the central hall type, both as regards the through ventilation, the ample window area and the efficient lighting, and he would recommend its adoption in the building of the next school which the Local Authority may erect.

Before concluding these remarks on the types of building one would point out that the structural defects cited later on under ventilation, lighting, and sanitation, would be much more scientifically dealt with by entire prevention, when the buildings are first erected than by subsequent alteration. A repetition of any of the defects will only entail further outlay in the future. Hence it would be advantageous in the planning of new schools or the extension of existing ones that your Medical Officer should be given an opportunity of advising the Local Authority with regard to the fullest requirements of School Hygiene.

The ventilation and heating arrangements.

In 31 of the school buildings the ventilation is " natural "—by means of a combination of window ventilators, special tubes and roof extractors, according to the type of school.

In order to estimate with scientific accuracy the efficiency of the ventilation in any room, a prolonged investigation of a special nature would be required. Records should be made of, amongst other things, the carbon dioxide gas content of the air, the relative humidity together with the internal and external temperatures. Such an examination would be so protracted that at present one has to select other means of ascertaining the fitness of the air in a room ; in other words, to judge it by the effects it produces on the occupants of the room, rather than by its chemical and physical features.

Using this latter standard and taking into consideration the " freshness " of the atmosphere its temperature and the effect it had upon the alertness of the children, the ventilation in this group of schools is as a rule efficient.

Where defects exist they are due to the restricted or absent cross-ventilation, which is the structural weakness in the central hall type of school building.

The heating of these 31 buildings is on various systems, according to the size of the school, and on the whole it proves satisfactory.

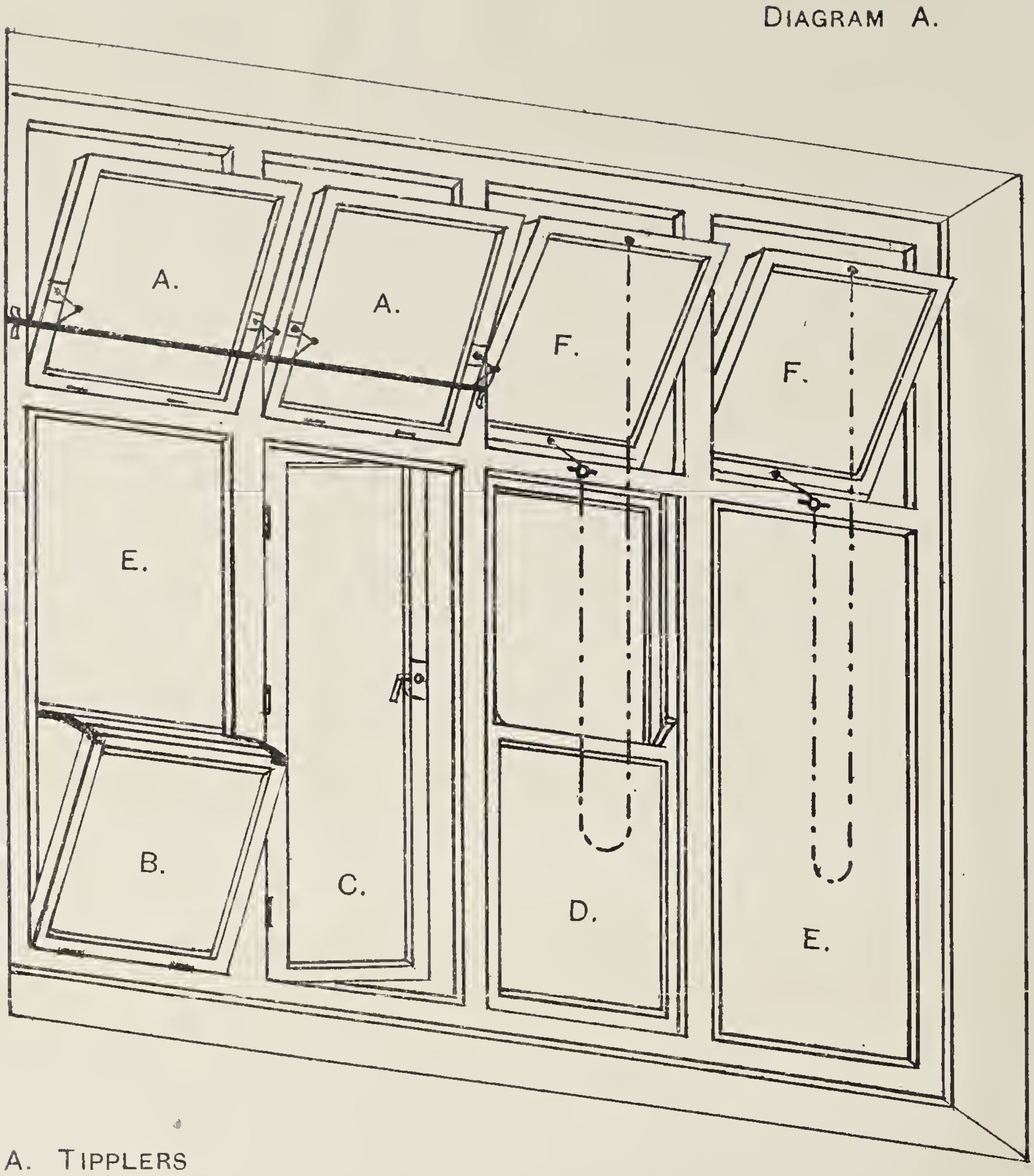
The three remaining schools have a mechanical system of ventilation—" the plenum "—which includes heating. This system is adequate for heating purposes, but experience of its use clearly shows that in order to be quite efficient for ventilation as well, some windows in each room, hall and corridor, should be made to open as required. Unless this is done the system does not prove to be an ideal one for an elementary school, and is undoubtedly a bad object lesson to the children. For children are quick to see that the windows of a " plenum " school are always shut, although in a lesson on hygiene they are taught that open windows are always desirable.

Ventilation in general.

As the ventilation of schools has far reaching and lasting effects on the health of both the teachers and the scholars, one would take this opportunity of presenting a consideration of the question in its general aspects.

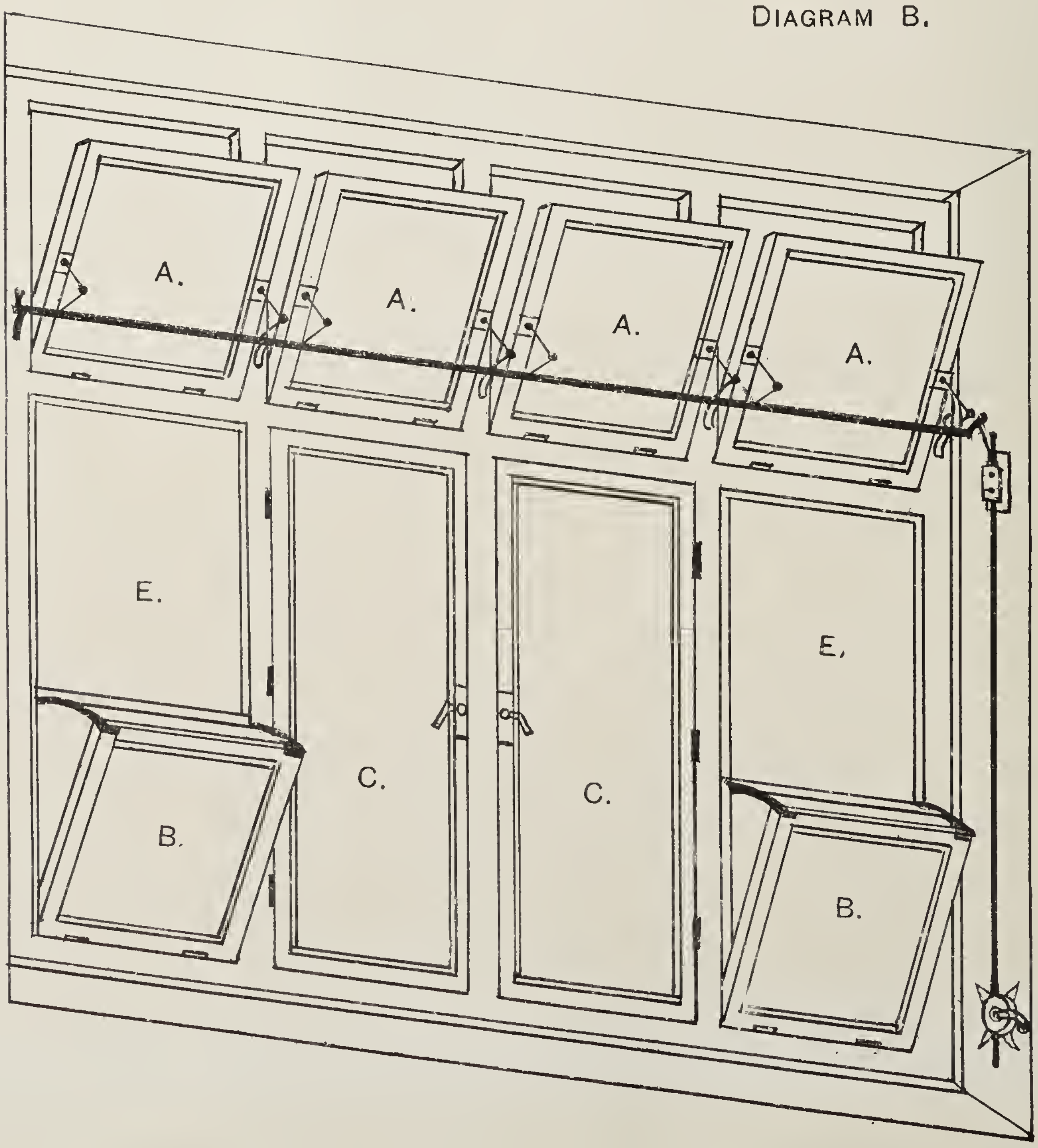
The ample supply of fresh air in all rooms where children are taught is accepted on all sides as of prime importance. Children are more susceptible than adults to the ill effects of the lack of fresh air, and in the class-rooms these show themselves by the fatigue which they produce. The outset of this fatigue is indicated by the drowsiness, the inattention to lessons, the restlessness

DIAGRAM A.



A. TIPPLERS
B. HOPPERS.
C. CASEMENTS HINGED OR PIVOTED.
D. DOUBLE HUNG SASH.
E. FIXED SHEETS.
F. CENTRE PIVOTED LIGHTS.

DIAGRAM B.



the inability to make much mental exertion, which those using the room experience, and is followed later by head-ache. Continued use of an impure atmosphere reacts later on children's health, reducing the nutrition, causing anæmia, and rendering the system more susceptible to infectious and other diseases by lowering its resistence.

A vitiated atmosphere in a class-room most frequently arises from one of two causes, either that the system of ventilation in the room is inadequate to provide for the needs of the average number of persons using it, or, that overcrowding of the room continually takes place. The latter condition should not be permitted. The former cause can be prevented by the detailed consideration of certain facts in the construction of the room.

Definite physical laws and requirements show the quantity of fresh air which is necessary in a room occupied for any length of time by a number of persons, also the quantity to be admitted and removed during the same time. As this quantity of air is dependent, amongst other things, upon the relationship existing between the inlets and the outlets in the room, the importance of preserving the correct ratio between these two factors and the number of persons using the room at once becomes evident. Experience has shown that this ratio is more satisfactorily attained and more fully under control to meet the varying changes in the external atmosphere, where cross-ventilation is the system used than when other methods are installed.

The type of window inlet governs the quantity of air which gains an entrance into a room, and also the distribution thereof ; consequently its construction is of importance and was made the subject for special observations in the schools during the year. The following are the chief window inlets found to be in use :—

The sash window, the casement window, the hopper ventilator, the tippler ventilator, the centre pivoted ventilator.

The centre pivoted ventilator proves to be the most unsatisfactory in practical application, because, first, it is impossible to prevent down draughts owing to its structure ; second, it cannot be properly regulated.; and third, its usual height from the floor level accentuates the other defects.

The combination which has been found to give the best results in the present prevailing type of school building in the Borough is the casement window with the hopper and tippler ventilators, the to two latter for continuous use, while the former is used when required.

Diagram A illustrates all these inlets, and diagram B shows the best combination thereof. For the preparation of these drawings I am indebted to the kindness of the Borough Surveyor, Mr. S. S. Platt, and Mr. P. C. Hathaway.

The proper use of the large opening—the casement window—is a point of considerable importance ; it is always required for flushing the room with fresh air during the school intervals, while in summer weather, when a large inlet opening is continually needed, its utility has only to be experienced to be fully appreciated. Full advantage should always be taken of the school intervals to admit fresh air thoroughly into each classroom. To do this efficiently in cold weather, it is not enough to open all the windows and ventilators when the classes disperse and leave them open till the children re-assemble. Such a course results in the rooms being too cold for use in the afternoon. Therefore, to secure the main object, while obviating the disadvantage cited, the rooms should first be flushed with fresh air for an hour, and then the windows closed sufficiently to ensure the suitable temperature for the afternoon session. School organisation should always be such that this duty is carefully and systematically discharged.

To supplement the window ventilators, Tobin's tubes are much used in the schools as inlets and are a useful addition to resort to, where the force of the wind or low external temperature prohibits the full use of the large openings. The chief drawback experienced in using the Tobin is the difficulty of keeping the tube clean, owing to the curves in its structure and to the fact that the external aperture is guarded by a fixed decoration. The height of the inlets from the floor level has an influence on the efficient working of the ventilation. If these are too low, draughts are produced along the floor, chilling the children's lower extremities ; while if too high, the resulting down-draughts frequently lead to the ventilators being kept shut. Five or six feet from the floor proves to be the best position for inlet openings; the outlets being placed high up and so guarded as to prevent them becoming down-draught inlets. Simplicity in construction greatly facilitates the proper use of ventilators, they require to be easily regulated and directly under the teacher's control.

The necessity for taking all these points into consideration in arranging a system of ventilation is increased by the physical fact that the temperature of a room is raised by the respirations of those using it, independently of any other source of heat. Hence it follows that when a classroom has been used continuously for some time it is advisable to be able to open more inlets and outlets for air and to reduce the artificial heating. Otherwise the heat exhaled will so raise the temperature that the other physical constituents of the vitiated air will produce undue fatigue.

Various observers have shown that several factors enter into the field of operation to produce fatigue. Haldane's observations result in the conclusion being drawn that the temperature and humidity of the atmosphere in a room are more potent agents in producing this fatigue than is the respiratory carbon dioxide gas present.

Dr. Kerr has recorded a series of experimental observations in the London Schools, regarding "the effect of ventilation on fatigue," which are of such practical importance that his conclusions are now quoted:—

"1.—Mental alertness and accuracy is improved by two or three hours' school work, provided "that the atmosphere is satisfactory."

"2.—Temperature above 65° F. gives rise to definite subjective symptons, slackness and "inattention to some, headaches in others. Although it is not easy to assert definite "mental alteration till about 70° F."

"3.—Symptoms do not appear at 65° if the air is kept in gentle movement by a fan in the "room. At higher temperatures the symptoms and mental conditions are ameliorated "by such movement of the air."

"4.—With temperatures 70° F. and above, other factors being normal, there are marked "symptoms and very evident deterioration in mental alertness and accuracy."

"5.—Relative humidity does not affect the mental capacity of children at low temperatures. "Increase of humidity appears to increase the effects of high temperatures."

"6.—Carbonic acid gas in considerable excess, although not producing the symptoms found "in a hot or close atmosphere, seems to produce, after a time, considerable fatigue "in the performance of mental functions in the children."

From a consideration of these conclusions it will be seen that they confirm and support what has been pointed out regarding the injurious effects of defective ventilation.

The subject has been thus presented in order to lay stress upon the importance of continued and careful attention to all the details in school organisation, which ensure suitable and thorough ventilation, both in existing schools and in new buildings. One would emphasise the fact that, by suitable school influence and environment a better understanding of the principles of home ventilation, will be conveyed to the children in lessons on hygiene. And, while it is not suggested that any of the extreme prejudicial conditions discussed, exist in the schools reported upon, the fact that they may arise has been dealt with in order to anticipate their occurrence by preventative measures.

The lighting.

The window lighting.

As found in the majority of the schools, this proves to be adequate for the needs of school work. In cases where defects have been reported upon, they have generally arisen from structural conditions in the buildings. This applies chiefly to some of the older schools, although the newer buildings are not all so planned as to be excluded from the same criticism.

The artificial lighting.

Both the source of the light and its distribution require consideration.

(*a*) The sources of light are gas and electricity.

Most of the schools are lighted by gas ; and these may be further subdivided into, those where ordinary gas burners are used ; and those where incandescent lights have been fixed. As to the relative efficiency of these two methods of using gas for school work, the incandescent system has proved to be much the better source of light.

In the schools where electricity is in use the system is found to be an excellent one, and it has advantages over the incandescent mantle which make it a more perfect one for school purposes. Chief amongst these advantages are the hygienic, namely the avoidance of the bye products of the combustion of gas which increase the impurities in the atmosphere, and the absence of shadow below the pendant lights. To these may be added the mechanical ones, relating to control, distribution, etc., while increased facilities in producing electric light have minimised the cost.

(*b*) The distribution of the lights.

The adequacy of the arrangements for artificial lighting, whether by gas or electricity, depends chiefly upon the following factors, the distribution of the lights, their number and position, together with the type of fitting adopted. In rather a large number of departments the illumination was found to be deficient, and investigation showed that in some or all of the above factors the installation was defective. The most marked deficiency existed, when the conditions found were, the use of the ordinary small gas burner on a centrally placed high fitting, without the correct ratio being maintained between the number of lights and the estimated accommodation of the classroom. Even when the incandescent mantle system was in use, the full illumination which it could give, was dimmed and reduced in power by the distribution of the lights and the unsuitable fittings. The type of incandescent fitting, which corresponds most to the single electric light pendant is the one which gives the best results, provided that, a large shade is used—the sides of which subtend an angle of 90 degrees, to ensure fullest reflection. Such a fitting when distributed at the correct height from the floor and in the number and position indicated by the accommodation of the room, affords adequate illumination and makes it possible to provide a separate light for the teacher's portion of the classroom.

In several of the schools reported upon as defective in artificial lighting alterations have been carried out during the year, and where possible your administrative staff have adopted the principles outlined above with satisfactory results.

The sanitary arrangements.

At the time of the inspection of the 34 buildings, which comprise the several school premises, the sanitary arrangements were found to be on the following systems :—

Water Carriage in	Pails in	W.C. and Pails in different departments in	* Privy Midden in	Total Number of Buildings
17	13	3	1	34

*Since this table was compiled for the report, this has been converted to the W.C. system.

The water-carriage system.

The conveniences provided in the schools where this system is in use are of two types, the trough closet and the separate pedestal closet. Of the former only a few exist, some being attached to the older type of school and some to the early modern ones. The separate pedestal convenience is the prevailing type adopted in the recently erected schools, and is the one most suitable in every way for school use.

The latrines were found to be clean as a rule ; where the condition was otherwise, it was attributable largely to the unsatisfactory state of the school yard surface.

The pail system.

This prevails in the older buildings and in one of the otherwise modern ones. It is an unsuitable system for school use in a large borough like Rochdale, both from the sanitary and the educational standpoint. The general arrangement of the conveniences, together with the disadvantages experienced in their use, specially at certain times of the year, clearly indicate that the resolution passed by the Local Authority at the end of 1909, will in process of time, bring about a much desired alteration.

The resolution was " That school closets generally shall be on the water-carriage system, and that in each case advantage be taken of the earliest opportunity for conversion." In view of the fact that a more general adoption of the water-carriage system is about to take place in the borough as a whole, the advantages of this change in the school system will be both hygienic and educational.

In those schools where the two systems described are used in different departments, the conversion of the pails will take place in due time, while in the case of the one school found to be on the old privy midden system the Health Committee are dealing with the matter. (*See Note under Table.*)

The cleanliness of the school premises.

In reporting upon the cleanliness of the schools it is found that this varies according to the geographical position and the uses to which such buildings are put outside school hours. The schools where the cleanliness was farthest removed from a reasonable standard were those drawing their children from the more crowded and poorer districts in the borough, and in which the available time for school cleaning was too short to ensure satisfactory results, as well as those where the school yard surfaces were of soft pervious material.

In all schools dust is found, and it is produced by the daily wear and tear of the floors and furniture, together with the routine work, and is augmented more or less by that introduced from outside the buildings. In visiting infant departments one has frequently been struck by the amount of dust produced in those classes where the younger children use small hand blackboards with chalk or crayons, for free-arm drawing. The old time slate and pencil were discarded as insanitary owing to the alleged difficulty of cleaning them aright, but one cannot say that the substitutes provided are any more sanitary, for, excess of dust plays the part of contributing cause in some of the physical defects found amongst the children examined.

What then can be done to lessen the amount of preventable dust in schools ?

Attention to the school yard surface when the building is being erected, or afterwards, has already been emphasised, while the proper use of the mats and scrapers provided at the entrances will be an additional safeguard, being both a salutary educational discipline and a practical hygienic lesson. Then again, parents can all co-operate with the Education Committee in minimizing school dust by giving adequate care to the condition of their children's clothing, for although in some cases the clothing has to be poor, parents can all see that it is clean.

When drawing attention to the defects of the appliances for free-arm drawing, as used by the infants, one fully appreciates the fact that the subject is one upon which educationalists hold strong and diverse views. Still one would point out that, if a suitable appliance, free from hygienic defects cannot be provided the question then becomes one of choosing between the educational interests and the health interests of the children.

When all the measures suggested above have been taken full advantage of, to prevent dust, there will still be an unavoidable quantity of dust and dirt in school buildings, which demands thorough cleaning to remove. To systematise more fully and amplify in some directions, the method of cleansing already carried out in the schools, a scheme of school cleaning was submitted for the consideration of the Committee during the year. The following is an outline of the essential points therein :—

School cleaning.

Daily Cleaning—

1.—Open all windows immediately after school closes in the afternoon, and keep them open while the sweeping is done.

2.—Use damp sawdust to sprinkle on all floors before they are swept. Use sawdust freely and sweep it up with a damp brush.

To have the sawdust sufficiently moist, soak it in water over night.

3.—Use a damp cloth to do all dusting.

4.—Cleansing of the Sanitary Conveniences. Regular flushing of the water closets and urinals. Regular washing of the surrounding woodwork in all conveniences with disinfectant solution.

Weekly Cleaning—

1.—The floors of two or three classrooms—according to their size—to be scrubbed with soap and water. A rota of such rooms to be arranged by the head teacher.

2.—Accessible woodwork and glazed dados to be rubbed down with a damp cloth before the floors are washed. Accessible ventilators to be dusted.

3.—Suitable use of a disinfectant spray after the washing has been carried out.

Vacation Cleaning—

1.—Extension of the weekly cleaning to all parts thoroughly.

2.—Varnished furniture to be rubbed down with a cloth saturated with paraffin oil.

The damp sawdust suggested above has been in daily use in the schools for some time, and is the most suitable substance for the caretaker to sprinkle on the floors before sweeping them. The greater the quantity used and the more moist it is the more satisfactory will be the results.

The recommendations regarding the weekly cleaning constituted the most radical alterations in the prevailing routine, where daily sweeping with washing during vacation intervals had been the rule. Administrative difficulties arose against the general adoption of the principle entailed, hence, only in the case of the schools which required the weekly cleaning most, was spraying with a disinfectant agreed upon, instead of the fuller method. It is to be regretted that the more complete method could not be used. One would point out that thorough washing with soap and water is the first essential to be practiced in all efforts to secure reasonable cleanliness, and that it cannot be satisfactorily superseded by the use of disinfectants alone.

SECTION B.

The General Arrangements and Organization of Medical Inspection.

Adequate correlation between the School Medical Service and the Public Health administration in the borough has been secured by the appointment of your Medical Officer of Health as School Medical Officer, and the delegation of the work in the schools to your Assistant Medical Officer of Health.

The unification of all matters relating to the health of the public is essential for the securing of the most desirable results, and it is by a full appreciation and due proportioning of all aspects of the problems which arise in connection with school hygiene, that your Medical Officer is best able to advise, as to the lines of future progress, most productive of physical well-being to the borough as a whole.

This is true not only with reference to the carrying out of the legal and health requirements in the case of individual diseases, but also in its bearings upon the wider and more far-reaching influences under which the children live, and upon the environment where they receive such training as will fit them to be healthy men and women and suitably educated citizens in the future.

The assistance given to the Medical Officer.

Two school nurses were appointed by this Committee at the end of 1908, and since January, 1909, they have been assisting in the work of medical inspection, devoting all their time to their appointments. The nurses are the entire staff wholly available for the work, and consequently their duties are varied, entailing inspection in the schools, home visiting, assisting at the office and ophthalmic examinations, as well as the clerical work arising out of the inspection of the schools in their respective districts. The change of occupation provided by this combination of work is appreciated by the staff, as it obviates the disadvantages accruing from continuous inspection alone. Further details of the nurses' work and its results will be given later on.

It was pointed out in last year's report that the head teachers and their assistants had done all in their power to heartily co-operate with the Medical Staff, and one has again to emphasise the importance of the assistance which they have given so readily. In all instances this help has been forthcoming most ungrudgingly, and while the clerical assistance which they have afforded as a preliminary to the inspection has materially contributed to the efficient working of the scheme, their active influence and continued interest in the aims of the work have been of much greater moment and most productive of permanent results. This influence has been used on all sides to ensure that the new work commended itself to parents and children alike.

The visits paid to the schools by the Medical Staff are, of necessity, at considerable intervals, and it is only by the sustained interest and continued participation in the work of increasing the knowledge of personal hygiene possessed by the children, on the teachers' part, that the maximum benefit to the children's health will result, so far as the school conditions can influence it. Being in daily contact with the children during the most impressionable period of their growth, teachers have an unique opportunity of training the developing minds on the best lines of physical health and well-being, and of thus becoming, one of the strongest and most potent auxiliary forces which Medical Officers can rely upon in their work of preventing disease.

SECTION C.

General survey of the scope of the work of Medical Inspection during the year.

Before reviewing in detail the results of the work carried out during 1909, a brief summary of its several branches will conduce to a fuller appreciation of its scope and utility.

1.—The carrying out of the requirements of the Codes of the Board of Education with regard to the medical inspection of " entrants " and " leavers " comprises the major portion of the actual inspections, while cases selected by the teachers for special examination also require supervision. The technique of this inspection is on the lines defined in last year's report, and longer experience of its application is desirable before critically reviewing the *modus operandi.*

2.—Arising out of the above inspection, a proportion of the children from each school require further examination at the office, and at such examination their parents are always invited to be present.

3.—The extended duties of the School Nurses with respect to the examination of all girls with reference to cleanliness—as was recommended in the special report submitted to the Committee in May last (Section E.)—next calls for detailed organization.

4.—The weekly examination of children *re* school attendance, regarding whom no medical certificates are available, affords desirable and useful information of existing contagious diseases, and obviates unnecessary absence from school.

5.—The administrative measures regarding the infectious diseases and the investigation of any outbreaks thereof in schools, demand continual supervision.

6.—The selection of suitable eye cases for special examination by your Ophthalmic Surgeon is a necessary corollary to the general inspection.

These branches of the medical inspection are so interdependent that it is not practicable to report upon them all severally; hence the facts now presented are classified as in last year's report.

1.—216 visits have been made to the 31 schools in the borough for the purposes of the routine inspection, 106 to infant, and 110 to mixed departments respectively. The investigation of infectious epidemics and other special inquiries necessitated other visits.

2.—The principle on which the children were selected.

This was in accordance with the Codes in force during the year, which called for the inspection of all children entering school, classed as " entrants," as well as those expected to leave school, styled " leavers."

As the Local Authority provides for the admission to school of children between three and five years of age, the " entrants " include children varying in age from three to six years, and it was deemed advisable to select twelve years of age as that at which expected " leavers " should be examined. Thus ensuring that no child would be likely to leave school entirely without medical inspection.

From experience in the working of this principle of selection one would point out certain disadvantages therein.

First as regards " entrants." The routine medical inspection of children aged three and four years has these drawbacks, *i.e.*, the children are irregular in their attendance, they are often difficult to examine satisfactorily owing to their nervous anxiety at the ordeal, and the results of inspecting them show that their physical condition would be more satisfactorily estimated when they had reached the age of five years. The seeing of all infants by the school nurses with reference to cleanliness and the selection by them of any whose physical condition demanded medical inspection, would be an arrangement which would adequately meet the needs of this group of children.

Five years of age is the earliest suitable one at which to fully examine school children.

Then with reference to " leavers." As has been indicated, 12 years was the age selected at which to inspect these children, and the summary in the next sub-section, shows that whereas 1,603 children were inspected aged 12, only 229 were seen aged 13. A similar disparity between the numbers in the two age groups was pointed out in last year's report, and from both these returns the inference is that a large proportion—from 80 to 86 per cent.—of the children in the schools of the borough leave when they reach 13 years of age. Consequently as these children leave so soon after they have been inspected, there is little opportunity of adequate after-supervision with reference to the defects from which they suffer, and which materially handicap them in physique to withstand disease in later life.

One would therefore emphasise the fact that 10 years of age would be a better period at which to examine children, than just before they leave school, as is now done. This age would still be the most suitable, even if the minimum age for " full time " work be raised to 14 years. By this means those found to be defective at 10 years would be under supervision and instruction for a reasonable time before leaving school, and those who required it could be inspected in their final year.

The scheme of inspection adopted for the borough provides for the inclusion of children aged seven in the medical work of the next school year. Seeing that the School Medical Officer's report relates to the calendar year, it would simplify organization considerably if the requirements of the Code with reference to all matters connected with Medical Inspection, co-terminated with the same period.

3.—The number of children examined during the year.

The classification of the children according to age and sex, as well as the number of those submitted by the teachers for special examination, classified under sex alone, is as follows :—

Sex	Age Last Birthday											Presented by the Teachers unclassified for age	Totals
	3	4	5	6	7	12	13	14	15	16	Totals		
Boys ...	176	358	625	11	54	799	113	24	3	1	2,164	444	2,608
Girls ...	155	361	591	11	73	804	116	18	1	...	2,130	376	2,506
Total ...	331	719	1216	22	127	1603	229	42	4	1	4,294	820	5,114

From this it will be seen that of the 4,294 children fully inspected, those aged 5 and 12 years when combined, comprised 65 per cent. of the whole. The parents of these 4,294 children had due notice of the inspection, yet only 25 (0·5 per cent.) took the opportunity of being present, while 14 (0·3 per cent.) objected to the examination taking place.

In two schools, in view of next year's work, children of seven years of age were inspected, to find out what their condition really was.

4.—The children who were found requiring fuller examination than could be carried out in school numbered 228 (5 per cent.) of the 4,294 inspected at the required ages, and 218 (26 per cent.) of the 820 seen as " special " cases. The group of children seen as " special " cases included all children, not otherwise inspected, who suffered from obvious defects so far as their class teachers could determine, consequently a much larger proportion of these were found to be seriously defective than was the case in the other larger group.

5.—Of the 4,294 children inspected, it was considered necessary to communicate with the parents of 2,094 (48 per cent.) regarding the existence of defects of such a nature that they required medical treatment. The results of the inspection described in Section D. show how varied these defects were, and owing to the existence, in many instances, of more than one defect in the same child, they are not further classified here.

6.—The time occupied on the strictly medical portion of the inspection has been 5½ minutes per child, taking the average of the time spent in the case of each group of children. For the individual child the time has often been longer and also shorter, according to the physical conditions found. If to this strictly medical time is added that of the teachers spent in the preliminary preparation, which includes the weighing and measuring, also the time occupied by the school nurses in the subsequent recording work, the complete inspection of each child required a much longer period.

SECTION D.

The Physical Conditions found during the inspections classified according to the Schedule used.

The Heights and Weights.

All children inspected over five years of age were weighed and measured under similar conditions as far as was possible, *i.e.*, without boots or shoes, but wearing their ordinary clothing.

The recorded heights are all therefore comparable, but the weights are not equally so. This inequality arises from the fact that the number of children overclothed exceeded in number those insufficiently clothed, with the result that to make the usual average allowance for clothing according to the age and sex would still leave the weights dis-proportionate to the actual body weight of the children. Even if such an allowance could be accurately made the resulting weights of the Rochdale children, as is discussed later, would contrast still more unfavourably with those of the other children used for comparison

To adequately record and demonstrate the physique of the children, three sets of Tables have been prepared.

1. School Averages.

The first set gives the average heights (Table A.) and weights (Table B) of the children inspected in each school, classified for age and sex, together with the number seen in each instance.

Table A.

Average Heights in each School, 1909.

SCHOOL	BOYS						GIRLS					
	Age 5			Age 12			Age 5			Age 12		
	No. Exam.	Average Cms.	Height Ins.	No. Exam.	Average Cms.	Height Ins.	No. Exam.	Average Cms.	Height Ins.	No. Exam.	Average Cms.	Height Ins.
Baillie-street	...	...	...	40	136·94	53·90	...	...	...	36	136·41	53·72
Belfield	7	100·75	39·75	...	...	...	10	100·67	39·66	...	...	...
Brimrod	31	102·97	40·54	22	135·80	53·46	39	103·11	40·60	29	139·14	54·84
Castlemere	...	...	...	29	136·19	53·60	...	...	...	24	140·75	55·40
Castleton Council	25	102·84	40·50	30	132·50	52·17	30	102·50	40·35	25	139·75	55·
,, St. Edward's	23	104·84	41·30	19	140·78	55·44	10	101·25	39·85	20	136·60	53·78
,, St. Gabriel's	8	102·50	40 35	7	136·	53·55	8	101·81	40·10	11	133·18	52·42
,, St. Martin's	11	105·40	41·50	14	135·42	53·31	7	105·42	41·35	6	135·28	53·25
Central...	...	...	...	40	141·25	55·65	...	...	...	36	141·50	55·75
Cronkeyshaw........	42	102·70	40·82	30	136·25	53·65	33	102·	40·15	45	138·10	54·36
Derby-street.........	25	105·18	41·38	46	136·25	53·65	30	103·45	40·73	21	135·70	53·44
Greenbank	34	103·18	40·60	50	136·25	53·65	40	101·48	39·95	40	138·33	54·45
Halifax-road	35	102·75	40·50	35	137·	53·95	24	103·	40·55	42	139·25	54·81
Hamer–All Saints'	26	107·50	42·35	22	132·90	52·33	16	101·45	39·94	28	134·95	53·12
Healey................	14	107·25	42·20	13	139·	54·75	14	102·85	40·40	7	138·75	54·63
Heybrook............	52	103·25	40·65	68	144·25	56·85	47	102·47	40·33	60	137·50	54·15
Lowerplace	36	103·90	40·90	28	135·	53·14	31	101·45	39·93	44	137·75	54·30
Meanwood	21	105·25	41·43	22	137·25	54·05	25	103·	40·55	27	138·75	54·65
Milkstone	13	104·	40·95	...	...	...	14	103·80	40·87	...	...	...
Newbold Council ..	42	103·	40·55	40	139·10	54·75	36	102·50	40·35	37	138·	54·35
,, St. Peter's.....	22	99·75	39·30	26	139·20	54·81	25	100.41	39·55	29	137·50	54·15
Oakenrod............	20	105·50	41·55	25	137·75	54·25	20	102·55	40·37	22	136·38	53·69
Parish Church	22	102·80	40·49	42	135·67	53·45	14	101·81	40·10	30	139·10	54·75
Penn-street	14	99·66	39·26	...	...	...	18	100·18	39·43	...	...	...
St. Alban's	6	106·50	41·95	17	136·70	53·82	7	98·42	38·76	23	138·85	54·66
St. John's	1	95·25	37·45	21	134·38	52·89	...	...	...	24	134·37	52·89
St. Mary's, W.......	18	101·07	39·79	14	135·12	53·20	27	100·	39·40	22	134·77	53·05
St. Mary's, B........	33	102·75	40·50	38	137·65	54·19	29	103·87	40·91	37	138·50	54·55
St. Patrick's	2	101·	39·85	20	133·87	52·70	1	93·	36·60	29	134·55	52·96
Spotland	34	105·25	41·50	36	138·37	54·46	25	103·96	40·94	39	138·50	54·55
St. James', Thorn.	8	105·	41·35	5	133·75	52·65	11	101·86	40·14	11	135·36	53·28

Table B.

Average Weights in each School, 1909.

SCHOOL	BOYS						GIRLS					
	Age 5			Age 12			Age 5			Age 12		
	No. Exam.	Average Weight Kilos.	Average Weight Lbs.	No. Exam.	Average Weight Kilos.	Average Weight Lbs.	No. Exam.	Average Weight Kilos.	Average Weight Lbs.	No. Exam.	Average Weight Kilos.	Average Weight Lbs.
Baillie-street	...	...	...	40	31·7	69·9	...	...	...	36	30·4	67·
Belfield	7	17·2	37·90	...	...	...	10	16·6	36·60	...	...	...
Brimrod	31	18·3	40·35	22	32·1	70·75	39	17·8	39·25	29	34·	74·95
Castlemere	...	...	...	29	30·8	67·90	...	...	...	24	31·70	69·90
Castleton Council	25	17·1	37·70	30	30·9	68·15	30	17·3	38·15	25	32·60	71·70
,, St. Edward's	23	17·8	39·25	19	32·1	70·75	10	16·3	35·90	20	29·80	65·70
,, St. Gabriel's	8	17·7	39·	7	32·4	71·45	8	16·8	37·	11	29·70	65·45
,, St. Martin's..	11	17·1	37·70	14	32·5	71·65	7	16·8	37·	6	28·10	61·95
Central	...	...	...	40	32·9	72·55	...	...	...	36	32·80	72·30
Cronkeyshaw........	42	17·	37·50	30	31·5	69·45	33	16·50	36·40	45	33·20	73·20
Derby-street	25	18·	39·70	46	32·6	71·90	30	17·70	39·	21	31·	68·35
Greenbank...........	34	18·3	40·35	50	31·9	70·25	40	16·90	37·25	40	33·20	73·20
Halifax-road	35	18·4	40·55	35	32·2	71·	24	17·20	37·90	42	33·10	73·
Hamer–All Saints'	26	18·1	35·90	22	31·1	68·55	16	16·90	37·25	28	31·70	69·90
Healey................	14	17·6	38·80	13	32·5	71·65	14	16·40	36·15	7	30·30	69·
Heybrook............	52	17·5	38·60	68	33·1	73·	47	17·10	37·70	60	31·	68·35
Lowerplace	36	18·3	40·35	28	31·4	69·20	31	17·70	39·	44	32·10	70·75
Meanwood	21	17·9	39·55	22	31·7	69·90	25	16·80	37·	27	30·80	67·90
Milkstone............	13	17·3	38·15	...	...	...	14	16·70	36·80	...	...	...
Newbold Council	42	17·7	39·	40	32·2	71·	36	16·90	37·25	37	32·70	72·10
,, St. Peter's	22	16·8	37·	26	32·20	73·20	25	16·70	36·80	29	32·30	71·20
Oakenrod.............	20	17·6	38·80	25	31·4	69·20	20	16·40	36·15	22	29·90	69·
Parish Church	22	16·9	37·25	42	30·1	66·35	14	15·90	35·05	30	29·80	67·
Penn-street	14	15·9	35·05	...	...	...	18	15·90	35·05	...	...	...
St. Alban's	6	18·2	40·15	17	30·9	68·15	7	17·70	39·	23	30·60	67·45
St. John's	1	14·2	31·30	21	29·	63·95	...	...	...	24	29·30	64·60
St. Mary's, W.......	18	16·7	36·80	14	33·	72·75	27	15·90	35·05	22	30·60	67·45
St. Mary's, B........	33	17·5	38·60	38	32·7	72·10	29	17·20	37·90	37	32·40	71·45
St. Patrick's.........	2	15·4	33·95	20	30·4	67·	1	14·80	32·60	29	29·80	65·55
Spotland	34	18·7	41·25	36	32·5	71·65	25	17·30	38·15	39	32·	70·50
St. James', Thorn	8	18·1	39·90	5	31·2	68·80	11	18·20	40·15	11	32·40	73·65

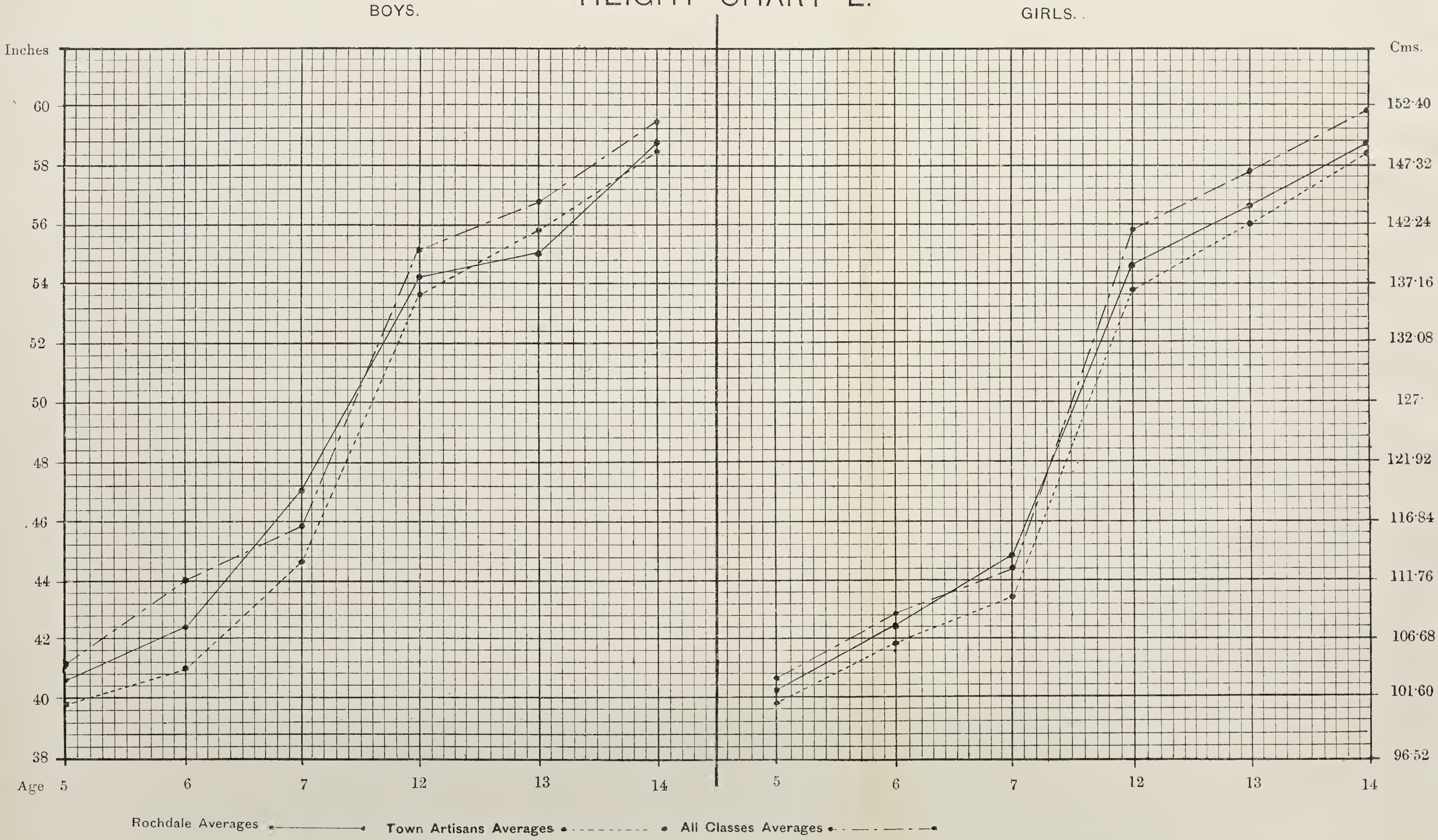
In these tables the figures relate to children of 5 and 12 years of age only. The numbers inspected at the other ages given on the following pages were too few in number and too irregularly distributed throughout the various schools to afford reliable statistics in regard to individual schools.

The tables show that in some schools the numbers dealt with were very small, the reason being that the children in such schools were reported upon in 1908.

2. Borough Averages.

The second set of tables gives the average heights (Table C and Chart E), and weights (Table D and Chart F) of all the children seen in the borough at certain age periods, and consequently the averages thus obtained afford the most reliable information up till now available as to the stature and weight of the elementary school children.

HEIGHT CHART E.



WEIGHT CHART F.

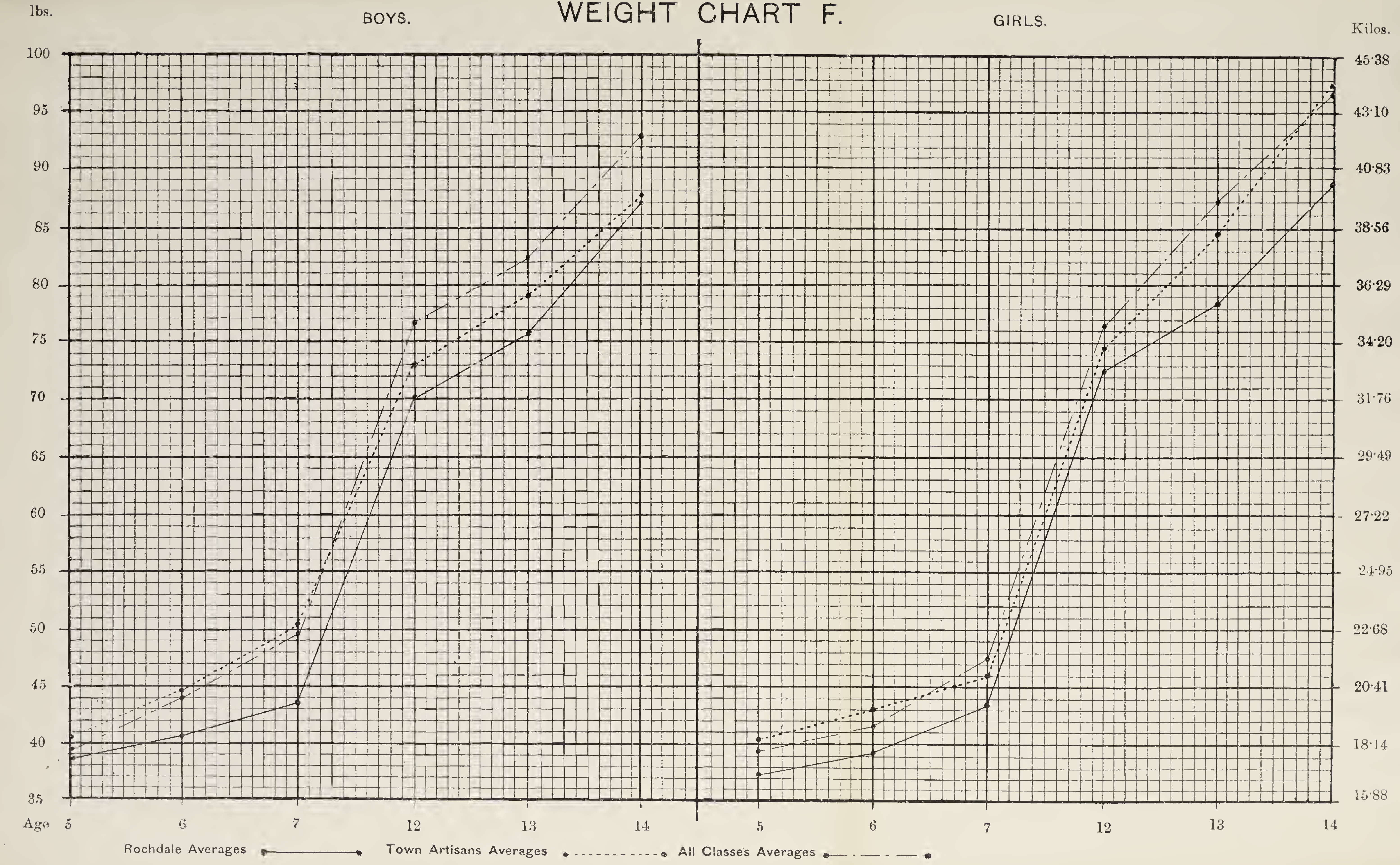


Table C.

Showing Average Heights (without shoes) at certain ages of Rochdale Elementary School Children, and Children of Towns (Artizans) and Town and Country (All Classes) of the Population of Great Britain.

Age last Birthday	BOYS							GIRLS						
	Rochdale School Children			British Association Tables, 1883				Rochdale School Children			British Association Tables, 1883			
				Towns Artizans		Town & Country All Classes					Towns Artizans		Town & Country All Classes	
	No. Exam.	Average Cms.	Height Ins.	No. Exam.	Av. Ht. Ins.	No. Exam.	Av. Ht. Ins.	No. Exam.	Average Cms.	Height Ins.	No. Exam.	Av. Ht. Ins.	No. Exam.	Av. Ht. Ins.
5	625	103·54	40·78	167	39·72	201	41·03	591	102·24	40·23	104	39·77	157	40·55
6	11	108·40	42·67	231	41·90	266	44·00	11	107·94	42·50	131	41·84	189	42·88
7	54	119·66	47·10	264	44·60	307	45·97	73	113·95	44·85	96	43·56	173	44·45
12	799	137·36	54·08	194	53·72	1,981	54·99	804	139·00	54·73	93	53·98	225	55·66
13	113	139·92	55·10	614	55·81	2,743	56·91	116	143·52	56·51	58	56·22	206	57·77
14	24	149·42	58·84	1,653	58·61	3,428	59·33	18	149·00	58·65	63	58·56	240	59·80

Table D.

Showing Average Weights (with clothing, without shoes) at certain Ages of Rochdale Elementary School Children, and Children of Towns (Artizans) and Town and Country (All Classes) of the Population of Great Britain.

Age last Birthday	BOYS							GIRLS						
	Rochdale School Children			British Association Tables, 1883				Rochdale School Children			British Association Tables, 1883			
				Towns Artisans		Town & Country All Classes					Towns Artizans		Town & Country All Classes	
	No. Exam.	Average Kilos.	Weight Lbs.	No. Exam.	Av. Wt. Lbs.	No. Exam.	Av. Wt. Lbs.	No. Exam.	Average Kilos.	Weight Lbs.	No. Exam.	Av. Wt. Lbs.	No. Exam.	Av. Wt. Lbs.
5	625	17·6	38·8	164	40·9	193	39·9	591	16·9	37·2	108	40·3	160	39·2
6	11	18·5	40·6	189	44·6	224	44·4	11	17·8	39·2	122	43·1	178	41·7
7	54	19·8	43·6	205	50·7	246	49·7	73	19·8	43·6	99	46·2	148	47·5
12	799	31·8	70·0	146	73·0	1,786	76·7	804	32·9	72·5	183	74·9	419	76·4
13	113	34·1	75·2	640	79·0	2,443	82·6	116	35·5	78·2	65	84·9	209	87·2
14	24	39·5	87·0	1,396	87·3	2,952	92·0	18	40·2	88·5	61	97·7	229	96·7

To enable one to compare the Rochdale figures with similar ones, there have been included in the tables, extracts from the Final Report of the Anthropometric Committee of the British Association, published in 1883, which forms the latest basis of comparison classified in this way. When figures are obtainable from more recent observations, it will then be possible to compare Rochdale children with those similarly surrounded in other centres.

The Charts A and B, drawn up from these two tables, represent in graphic form the same facts, and each of them requires separate consideration. On the charts, the ages represented are 5, 6, 7, 12, 13 and 14 years, but it will be seen from the tables that the smallness of the numbers of those dealt with locally of 6, 7, 13 and 14 years respectively prohibits fair comparisons being drawn at those ages.

The numbers examined of 5 and 12 years old, however, are large enough to warrant such comparisons and to be taken as representing the average physique of the children.

THE HEIGHT CHART E.

Taking the four groups of children, boys of 5 and 12, and girls of 5 and 12, it is seen that while the Rochdale children exceed in average height the Towns class by 1·06, 0·36, 0·46 and 0·75 of an inch in each case, they are below the average stature of the Town and Country combined classes by 0·25, 0·91, 0·32 and 0·93 of an inch respectively. The figures further indicate the already established anthropometric fact that whereas at 5 years of age boys are slightly taller than girls (0·55 of an inch in the local figures) at 12 years of age the position is reversed, the girls being the taller (by 0·65 of an inch locally).

Although boys are later starting to increase rapidly in height than girls, they continue to grow for a longer period and finally reach a higher standard.

THE WEIGHT CHART F.

In contrasting the average weights of the Rochdale children with the others, it is at once seen that in all four groups they are below the other averages ; as compared to the Towns class they are 2·1, 3·0, 3·1 and 2·4 lbs. respectively below, while they are 1·1, 6·7, 2·0 and 3·9 lbs. respectively less than the Town and Country combined class. This deficiency in weight cannot all be accounted for by the fact that the Rochdale children were weighed without and the others with their boots or shoes. As compared to the Town and Country combined classes, the deficiency in weight is greater in proportion than the deficiency in height, and is most marked amongst boys of 12 years.

3. "Collective Height" and "Collective Weight" Figures.

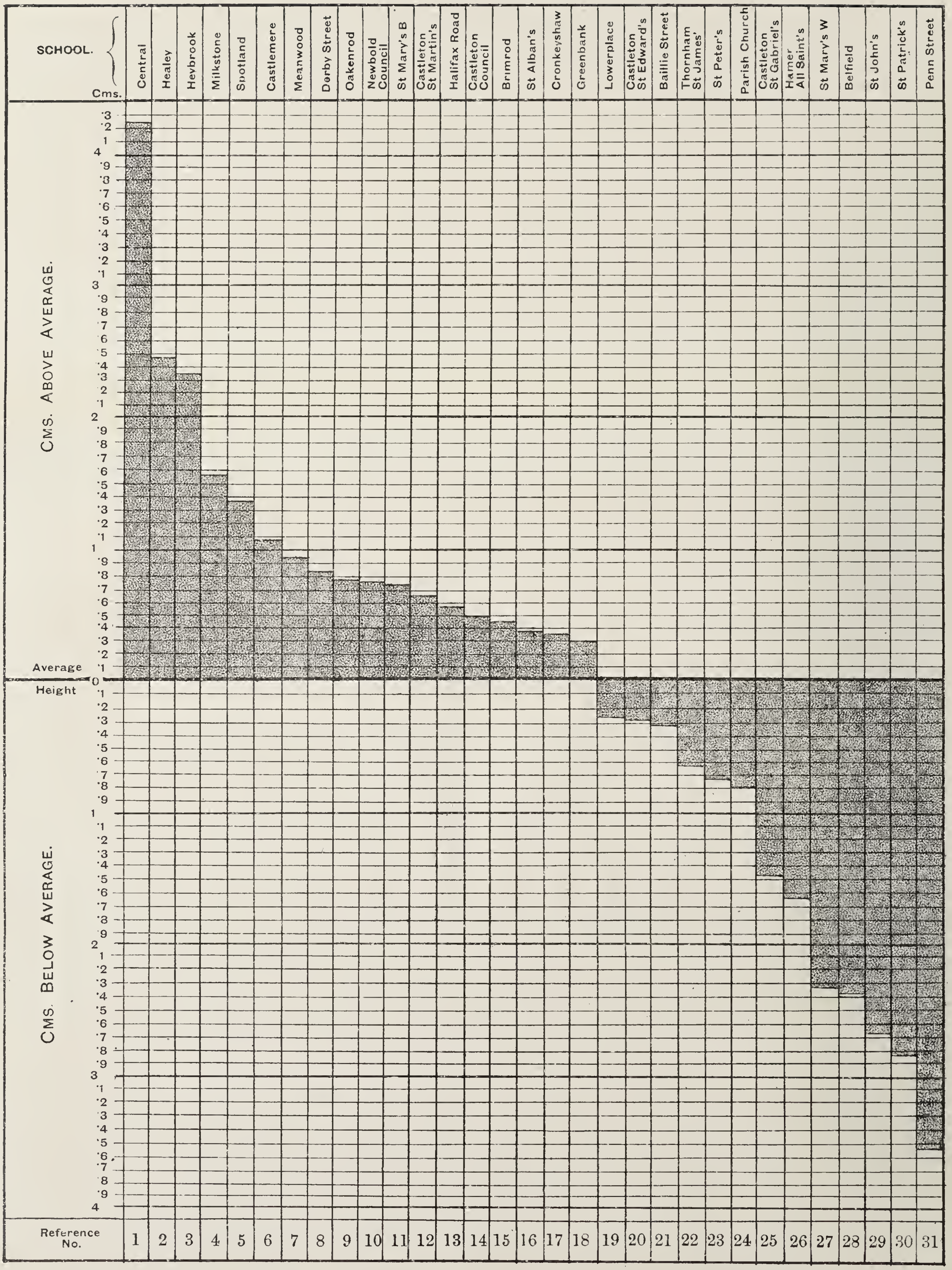
The final set of tables (G and H) and charts (I and J) in this section record the relative positions of the schools as regards the height and weight of children aged 5 and 12 years last birthday.

Table G.				**Table H.**			
HEIGHT				WEIGHT			
Place on Chart I	School	No. measured	Collective Height Figure	Place on Chart J	School	No. weigh'd	Collective Weight Figure
1	Central	76	+4·25	1	Brimrod	121	+1·69
2	Healey	48	+2·47	2	Thornham St. James'	35	+1·69
3	Heybrook	227	+2·32	3	Halifax-road	136	+1·16
4	Milkstone	27	+1·55	4	Lowerplace	139	+1·12
5	Spotland	134	+1·37	5	Central	76	+1·11
6	Castlemere	53	+1·09	6	Spotland	134	+0·92
7	Meanwood	95	+0·92	7	Newbold, St. Peter's	102	+0·79
8	Derby-street	122	+0·83	8	Greenbank	164	+0·69
9	Oakenrod	87	+0·79	9	St. Mary's, Balderstone	137	+0·69
10	Newbold Council	155	+0·74	10	Castleton Council	110	+0·67
11	St. Mary's, Balderstone	137	+0·73	11	Derby-street	122	+0·56
12	Castleton, St. Martin's	38	+0·64	12	Newbold Council	155	+0·54
13	Halifax-road	136	+0·57	13	Heybrook	227	+0·45
14	Castleton Council	110	+0·50	14	Hamer, All Saints'	92	+0·23
15	Brimrod	121	+0·43	15	Meanwood	95	+0·22
16	St. Alban's	53	+0·35	16	Healey	48	−0·16
17	Cronkeyshaw	150	+0·34	17	St. Alban's	53	−0·19
18	Greenbank	164	+0·30	18	Castleton, St. Edward's	72	−0·23
19	Lowerplace	139	−0·26	19	Castleton, St. Martin's	38	−0·27
20	Castleton, St. Edward's	72	−0·27	20	Milkstone	27	−0·31
21	Baillie-street	76	−0·33	21	Castlemere	53	−0·43
22	Thornham, St. James'	35	−0·64	22	Cronkeyshaw	150	−0·51
23	Newbold, St. Peter's	102	−0·74	23	Belfield	17	−0·52
24	Parish Church	108	−0·79	24	Oakenrod	87	−0·58
25	Castleton, St. Gabriel's	34	−1·46	25	Castleton, St. Gabriel's	34	−0·69
26	Hamer, All Saints'	92	−1·63	26	Baillie-street	76	−0·80
27	St. Mary's, Wardlew'th	81	−2·36	27	St. Mary's, Wardlew'th	81	−1·07
28	Belfield	17	−2·38	28	Parish Church	108	−1·54
29	St. John's	46	−2·69	29	St. Patrick's	53	−1·57
30	St. Patrick's	53	−2·82	30	St. John's	46	−2·38
31	Penn-street	32	−3·54	31	Penn-street	32	−2·54

CHART I.

COLLECTIVE HEIGHT FIGURES

FOR EACH SCHOOL.

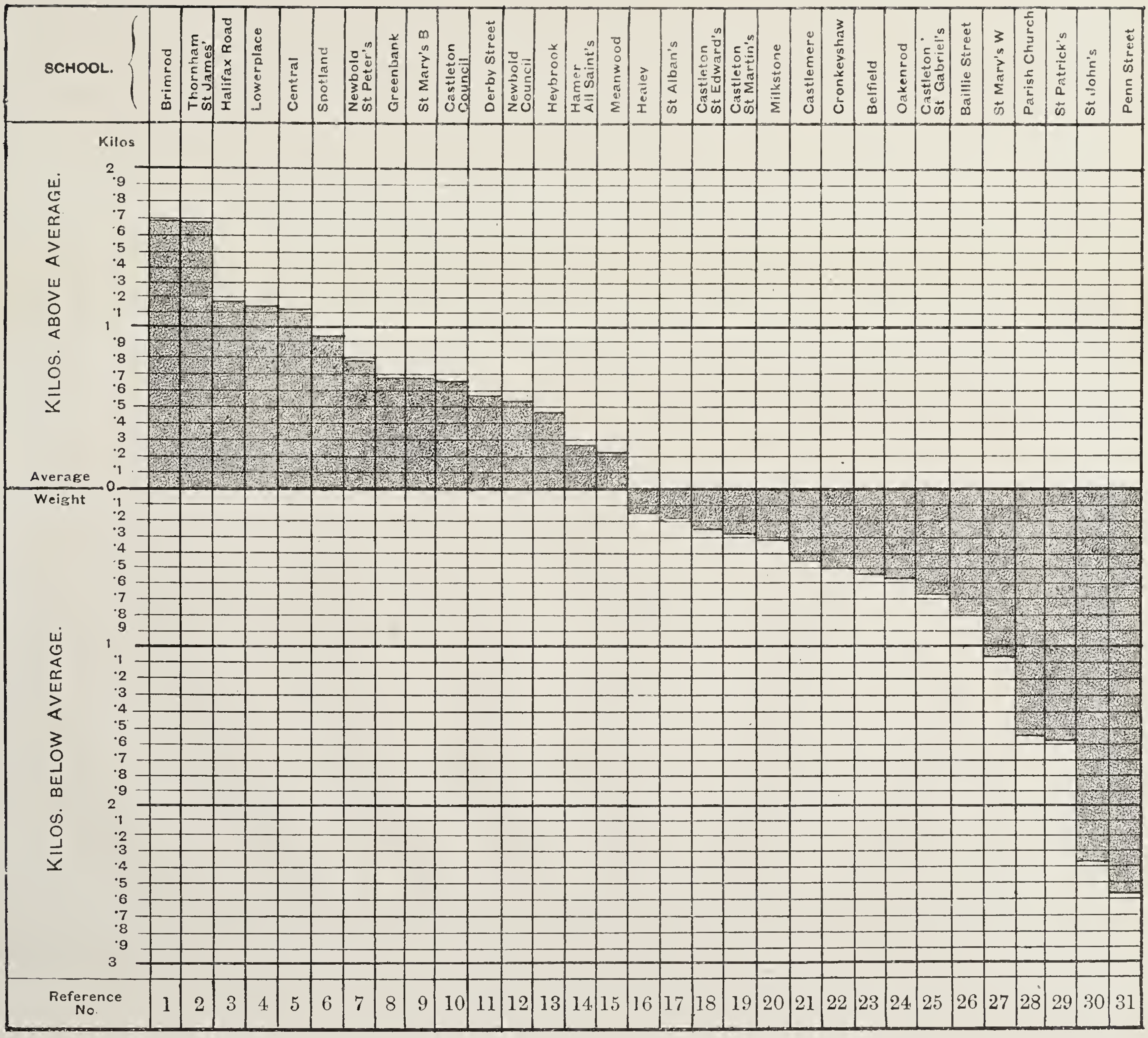


Average Height of Boys of 12 years taken as Standard.

CHART J.

COLLECTIVE WEIGHT FIGURES

FOR EACH SCHOOL.



AVERAGE WEIGHT OF BOYS OF 12 YEARS TAKEN AS STANDARD.

To compare the various schools in the borough with each other, as to the bearing of the anthropometric records obtained, it is essential to group the children under each age and sex, contrasting the results thus classified for similar ages and sexes. As the number of children dealt with in each school is only a small proportion of the whole, the averages obtained in each group by this method lead to fallacious deductions. Hence, instead of considering the measurements in this manner, a method of standardizing the figures, which would combine in their correct ratio the influences of age and sex upon the stature and weight of the children in each school has been carried out. From it has been calculated " collective height," and " collective weight " figures which express relatively to the selected standard, the physique of the children inspected. Such figures are comparable and permit of all the schools being classified in the order of their " collective height " and " collective weight " figures.

In preparing these tables advantage has been taken of the method adopted by Dr. T. H. C. Stevenson, Superintendent of Statistics, Somerset House, and applied by him last year to the measurements obtained under the scheme of Medical Inspection of the Somerset County Council.

Before outlining the method, it is necessary to point out that differences in the rate of growth of children of the same age increase rapidly as the age advances till maturity is reached. In other words the significance to be attached to differences in height found amongst boys of 5 years of age, is greater than that indicated by differences found amongst boys of 12 years of age. The values are in inverse proportion to the differences. The method used applies equally to height and weight and for brevity in outlining it, the steps used in ascertaining the " collective height " figures will be stated.

Having obtained the average height of the boys and girls aged 5 and 12 years respectively for the whole borough, the average deviation from the mean in each group was calculated and the average height of the boys of 12 selected as the standard of comparison. Then the recorded total heights in each of these groups in a school were first compared with the borough average for that group and the resulting excess or deficiency corrected by factors to that of the selected standard. From the sum of these " corrected " figures an average was derived. The figure thus obtained expresses in centimetre terms the excess or deficiency in height of all the children dealt with in a school when standardized to the average height of boys of 12.

From the " collective height " chart I., it is seen, that while 18 schools are above the average of the standard used, 13 are below it, and so far are many of these below the average that they almost counterbalance the other greater number of schools.

On the " collective weight " chart J, the position of the schools is considerably altered, some that were above the average in height being below in weight, and while now 15 are above 16 are below the average, with the net result that the " collective wieght " figure for the borough is below the average. In comparing the Rochdale children with those of the general population it was pointed out that they were much below the general averages in weight. The facts obtained from the " collective weight " figures confirm that observation.

The results recorded with reference to each school are an indication of the many factors which influence the growth and development of the children, and while in all cases the geographical position of the school building is not an index of the home surroundings of the scholars, in many instances it can be accepted as such. To estimate with accuracy the significance of the varied height and weight measurements in each school, these several factors have to be taken into account and so investigated as to apportion aright the parts which heredity, disease, social condition, housing and general home environment play in influencing for better or worse, the developing bodies of the children.

Further research on these lines will afford the true explanation of the facts recorded, while special investigations to correlate the height, weight and chest measurements of children with their housing conditions would afford valuable information on which to base future sanitary reform.

Clothing and Footwear.

Insufficiency of clothing and lack of water-tight footwear did not prevail to any great extent amongst the children inspected. In some degree this may be explained by the fact that having information as to when the medical inspection would take place, parents endeavoured as far as possible to make good any deficiency which normally existed. While of the 2,071 boys here reported upon, only 0·9 per cent. were insufficiently clad, and 2·9 per cent. inadequately shod ; there were of the 2,027 girls, ·98 per cent and 1·52 per cent. respectively deficiently supplied. Overclothing, specially of the younger children prevails to a larger extent than lack of clothing, and in their efforts to keep children well by sufficient clothing parents err as frequently in the opposite direction and render the children much more susceptible to variations in temperature by being overheated from too many clothes.

Lack of the necessary means prevents some parents from providing sufficient clothing for their children, and one admires them for the efforts they make with obviously scanty finance. But to send a child to school to sit beside other children and join in their games, with dirty clothing, is an index of parental lack of care, unfair to the carefully clothed and clean children and a source of increasing unnecessary contamination. Poverty and cleanliness are not incompatible, to be poor is a misfortune, not a disgrace, but to be dirty and bring children up with dirty habits and in dirty clothing is a discredit to twentieth century surroundings, and a reflection upon nineteenth century education.

Before proceeding to discuss the physical conditions prevailing amongst the children seen, one would point out that, in carrying out the work of medical inspection one is early presented with a considerable difficulty, that of deciding what physical disabilities constitute essential defects. There is no absolute standard to assist one, for as no human being is mathematically perfect in all the minute elements which go to make up the human body, a perfectly whole physique is lacking even amongst the young. From its very birth, the child bears traces of the continual conflict which it has to engage in to retain its grip on life, and in inspecting children the principle to be carried out is that of differentiating between the defects which are real sources of physical ill health, or predispose to ill health, and those which are only the scars sustained in life's struggle, entailing no subsequent liability to disease. Both of these groups of defects debar the classification of the person of having a perfect physique, but it is only the former which calls for careful consideration and treatment. In the succeeding parts of this section the groups of children, which from their numbers can be taken as giving the fullest indications of the prevailing physical conditions are reported upon. The age periods in which only a few children were seen are not included, consequently the tables used refer to 4,098 children, grouped under the ages of 3, 4, 5, 12, and 13 years.

Nutrition.

The nutrition of the body depends, in a growing child, upon so many conditions that its correct estimation has always been a complex problem. Many factors influence nutrition, the physique of the child at birth, its nurture, its power of assimulating food, its surroundings together with concomitant disease, all act upon its nutrition, and if these factors are of a prejudicial nature, lack of nutrition is the result, with interference in growth. The height and weight of a child are primarily an index of growth, in the adult they are an index of nutrition, hence in a child they are not as accurate a measure of nutrition as in the adult. Looking upon the child, on the other hand, as a grown organism for the time being, having certain physiological functions to perform, the lack of proper food in either quantity or quality causes certain changes which, when operable over a period produce malnutrition and later starvation.

Considering nutrition from this standpoint and taking the results of these changes as a basis of classification, a workable standard is arrived at, which serves to determine whether or not a child is physically underfed.

The extent to which marked under nourishment existed amongst those inspected is seen by the following summary :—

Number examined.				Under nourished.
4,098	Boys	2,071	...	42 (2 per cent.)
	Girls	2,027	...	35 (1·7 per cent.)

which shows that taken on the whole the nutrition, apart from growth, was good.

Skin Diseases.

The extent to which contagious skin diseases existed amongst those inspected was as follows :

	Number examined	Alopecia	Favus	Impetigo	Ringworm	Scabies	Total Number with Contagious Skin Diseases
Boys ...	2,071	5	...	14	7	...	26
Girls ...	2,027	...	...	9	3	...	12
Total ...	4,098	5	...	23	10	...	38

There were 64 other cases of Skin Disease of a non-contagious nature.

Ringworm.

This contagious disease, being caused by a parasite of the " mould " group, of which more than one variety is common in this country, gives rise to much more wide-spread disease than the number of children seen suffering therewith at the full inspection indicates. The cases, found then, were only those which had escaped detection by the teachers, or which were of so an atypical variety as to be difficult for them to decide upon. All children recognised to be suffering from ringworm are excluded from school. During the year 59 children were seen with reference to school attendance, who suffered from ringworm, chiefly on the head. All such were referred to their own medical attendants for treatment, and when they had so far convalesced as to be able to attend school with safety to others, their parents were advised to send them, provided they wore a thin cap and continued under your Medical Officer's supervision till such times as the cap could be dispensed with. Ringworm on the scalp occasions longer absence from school than when any other portion of the skin is affected therewith, and from prolonged observation of those so infected, one is of opinion that continued re-infection invariably takes place in protracted cases. Caps and bonnets are the most frequent causes of this re-infection, for just as the cap of a child who suffers from the disease will convey the disease to another child, so the sufferer, continuing to wear the same cap while infectious re-infects himself. This can be to some extent prevented by the child's cap or bonnet being " baked " in the kitchen oven and then well washed at frequent intervals, while suffering from the disease. In addition to the other usual precautions against the spread of infection to other children of the same household, the wearing of a suitable covering over the diseased part, at night, is essential.

Of the other contagious diseases, alopecia is most usually the result of ringworm, but is also sometimes caused by another organism. Scabies, caused by an animal parasite, has been found occasionally amongst children seen *re* school attendance.

Cleanliness.

The condition of the children as regards their clothing has been dascribed, and it here remains to record the general state of personal cleanliness.

(a) Personal cleanliness, as found by the School Nurses' work.

During the year the scheme of inspection as to cleanliness has been extended to all the girls in the schools, so far as the exigencies of other branches of the work permitted. It has been possible for the Nurses to visit all the departments and see the girls in all the schools once ; appended is the summary of the results.

	Number of Girls examined	Number .Clean	%	Number Verminous Vermin	Nits	Number of Cards Sent
Infant Departments ...	2,148	887.	41·2	67	1,194	537
Mixed Departments	4,289	1,509	35·2	67	2,713	1,124
TOTAL	6,437	2,396	37·2	134	3,907	1,661

A second visit was paid by the Nurses to four of the schools included in the above summary, and one is therefore able to give a comparative statement which reveals the improvement which had taken place after information was sent to the parents by the Nurses, or given to them at their homes.

	Number of Girls examined	Number Clean	%	Number Verminous Vermin	Nits	Number of Cards Sent
First Inspection	943	402	42·5	11	530	259
Second Inspection.........	935	503	53·7	6	426	205

(b) Personal cleanliness as found at the full inspection.

The inspection of the children carried out by the School Nurses just prior to the medical inspection gave the appended result :—

DESCRIPTION	AGE LAST BIRTHDAY										TOTAL	
	3		4		5		12		13			
	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	Boys	Girls
Clean	145	71	282	164	494	254	744	271	106	45	1,771 (85·6)	805 (39·7)
Skin Very Dirty..	7	9	30	10	46	13	20	12	5	3	108 (5·2)	47 (2·3)
Head Verminous.	24	75	46	187	85	324	35	521	2	68	192 (9·2)	1,175 (58·2)
Number examined Boys Girls	176	155	358	361	625	591	799	804	113	116	2,071	2,027
TOTAL	331		719		1,216		1,603		229		4,098	

Numbers in brackets are percentages.

These figures show how much freer from verminous conditions the boys in the schools are, at all ages, than is the case with girls. Girls' long hair naturally contributes to this result, but that short hair alone wont prevent the lodgment of the parasite, is clearly demonstrated by the detection of the infection in the case of those boys whose cleanliness was not what could be reasonably expected.

Verminous conditions are due to a specific parasite and its eggs (nits), and it is only by the complete removal of the latter from the hair that the continued existance of the former is prevented. The presence of uncleanliness due to this cause is not confined to those children whose general condition is dirty ; many otherwise clean and well cared for children suffer therefrom, and one fully appreciates the fact that in drawing the parents' attention thereto, in the latter instance, is a task both difficult and delicate, as all due regard must be given to personal susceptibilities. When it is more widely understood that nits are not naturally present in the hair, and when parents who have said to the School Nurses that they " would not like them (the children) to be quite without, as it is not healthy," come to realise that children can be and are healthy when perfectly clean, a higher standard of cleanliness in this respect will be reached.

During the year measures, to secure greater attention to this matter on the parents' part, have been adopted by the Education Committee, the details of which are noted in section E.

In conclusion one has to record with satisfaction that the standard of cleanliness observed shows a decided improvement, which, as will be seeen from this subjoined summary, is most marked where most required. The percentage recorded in 1908 are inserted for comparison.

The highest percentages for cleanliness in the Schools were :—

		1908	1909
Infant Department ...	... Boys	100%	... 97·1%
,, ,, ...	... Girls	57%	... 72·9%
Senior Department ...	... Boys	100%	... 100%
,, ,, ...	... Girls	74%	... 71·5%

The lowest percentages for cleanliness were :—

		1908	1909
Infant Department ...	... Boys	18%	... 63·7%
,, ,, ...	... Girls	0%	... 28·3%
Senior Department ...	... Boys	26%	... 68·2%
,, ,, ...	... Girls	2·2%	... 13·7%

These figures speak for themselves and show that the work of the School Nurses is already producing desirable improvement, increased comfort to the children and a material help to the teachers in their daily routine.

Teeth.

The outstanding feature observed amongst all the children inspected, irrespective of age or sex, was the extent to which dental caries prevailed.

In examining the children note was taken of the following points—(i.) are all the teeth free from decay ? (ii.) if not, how many are carious—whether under or over four in number ? The table attached shows that from 3 years of age, when 68 per cent. of boys and 62 per cent. of girls were found to have sound teeth ; the number at 5 years were reduced to 23 per cent. and 22 per cent. respectively, and at 12 years of age only 15 per cent. of boys and 16 per cent. of girls had quite healthy teeth and mouths free from the septic conditions consequent upon dental decay. The increase in the numbers with sound teeth at 13 years of age is apparent, not real, and arises from the fact that, while fewer children on the whole are in school at that age, the larger proportion thereof, are from the sound group of the 12 years old. These percentages would have been still lower had a dental mirror been used at the inspections to examine minutely each case.

Description	Age Last Birthday										Total	
	3		4		5		12		13			
	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.
Sound teeth...	112 (68·)	102 (62·2)	164 (45·8)	150 (41·5)	149 (23·8)	130 (22·)	139 (15·)	134 (16·7)	29 (25·5)	23 (19·8)	593 (28·6)	539 (26·)
1 to 3 carious....	46	39	124	135	250	258	398	384	51	50	869	866
4 or more carious....	18	14	70	76	226	203	262	286	33	43	609	622
No. examined— Boys	176		358		625		799		113		2,071	
Girls..........		155		361		591		804		116		2,027
Total........	331		719		1,216		1,603		229		4,098	

Numbers in brackets are percentages.

What efforts have been made by the parents of these children to preserve the teeth ?

So far any general attempt to have the teeth " filled " when the decay was at an early stage is non-existant, and the children who had had any actual dental treatment were " rara aves " indeed, their number being negligible for comparative purposes. The children giving daily attention to their teeth, by cleaning and mouth washing, are increasing in number, as a result of the efforts put forth by their teachers as occasion arises, and from the good use the School Nurses make of their opportunities when seeing the children in school, to point to them the need for greater cleanliness of the teeth and gums as an essential part of the attention which they should give to the care and health of their bodies.

To what causes then can such generalized disease of the teeth be attributable ?

Many forces combine in determining the development and growth of the teeth, the healthiness of the child at birth, the nature of its food and the care it receives from earliest infancy, all share in producing sound teeth, and any treatment or maltreatment of an infant which increases its liability to local disease of a septic or inflammatory nature, unfairly handicaps its chances of having sound milk teeth. To dogmatise and say that any one article of food or any single disease facilitated the production of the primary caries would be to express an opinion for which accurate scientific evidence is so far wanting. The scientific fact established is, that dental caries is microbic in origin, and that factors of growth, feeding, and surroundings predispose to its development.

Being microbic in origin, the fallacy of the popular idea that " bad " milk teeth do not matter is at once seen. When milk teeth are actively carious they call for just as much attention as a diseased bone, and to postpone such care till the infection is more wide-spread is only increasing the risks of the permanent teeth being likewise diseased. In the same way to postpone attention to the earliest sign of decay in one " permanent " tooth because it does not ache is to leave a source of danger to the other teeth always in the mouth. The facts shown respecting the children examined indicate that a fuller appreciation of the gravity of the condition is desirable and that the necessary care to be bestowed upon the teeth is of prime importance. Such care must be both preventative and curative—the preventative being twofold, that required from the child's birth with regard to food and surroundings, and that required, when the child reaches a suitable age, in the necessary daily attention to the cleanliness of the teeth ; while the curative measures should be adopted on the earliest signs of local disease. The prevalence of dental caries clearly demonstrates that the adoption of any general curative measures, unless accompanied by adequate training of the children as to the need for daily cleansing of the teeth as well, would not be productive of the maximum ultimate benefit.

The proper education of the children in this respect calls for the parents' continual attention, coupled with suitable school instruction in personal hygiene, and the occurrence of so much dental caries is one explanation of why the growth of the children of to-day—as shown by the measurements given—contrasts so unfavourably with those recorded 27 years ago.

Tonsils, Adenoids, and Enlarged Glands.

To interpret accurately the importance attaching to the figures found in the subjoined summary and the classification there used, each of the anatomical parts referred to will be treated separately.

Tonsils.

Tonsils are present in every one's throat and it is only when they become swollen and permanently enlarged that any interference with health arises. Children are specially liable to such enlargements taking place, chiefly, as a consequent upon either infectious (zymotic) diseases, catarrhal and other irritative inflammatory conditions, or carious teeth. Being once permanently enlarged, the tonsils interfere with the normal functions of nasal breathing, later, affecting the hearing, and in severe cases the mental alertness. A child so affected becomes more or less of a mouth breather in proportion to the degree of obstruction present, its power of working satisfactorily at school is materially diminished, while the secondary effects produced upon the chest and system generally are prejudicial to the child's full development. In examining school children then, the points to be determined are, the presence of enlarged tonsils, and the deciding of whether the enlargement is such as to require surgical treatment. The number of children, classified as having "Tonsils—much enlarged" (2·9 per cent. of boys and 3·2 per cent. of girls) required such treatment, and their parents were advised to consult their medical attendants. On the other hand the other group of children found to have "Tonsils—enlarged" require special attention being paid to the breathing and other physical exercises in which they take part in school, and their teachers are advised by your Medical Officer in all such cases.

	CONDITIONS	AGE LAST BIRTHDAY.										TOTALS	
		3		4		5		12		13			
		B.	G.	B,	G.	B.	G.	B.	G.	B.	G.	B.	G.
TONSILS AND ADENOIDS	Tonsils, normal	145	132	275	304	437	384	568	589	81	82	1,506 (72·8)	1,491 (73·8)
	Mouth Breathers from—												
	(*a*) Tonsils, enlarged	29	20	65	49	148	159	148	155	18	25	408 (19·3)	.408 (20·8)
	(*b*) Tonsils, much enlarged	1	2	8	4	23	31	20	29	3	8	55.(2·9)	74 (3·2)
	(*c*) Adenoids, or other Nasal Obstruction	1	1	10	4	17	17	63	31	11	1	102 (5·)	54 (2·2)
GLANDS	Glands, normal	49	40	62	66	50	69	200	185	33	32	394 (19·)	392 (19·3)
	Glands, palpable	122	112	293	295	568	514	599	616	80	84	1,672 (80·3)	1,621 (80·)
	Glands, much enlarged	5	3	3	...	7	8	...	3	...	...	15 (0·7)	14 (0·7)
	Number examined—												
	Boys	176		358		625		799		113		2,071	
	Girls		155		361		591		804		116		2,027
	TOTAL	331		719		1,216		1,603		229		4,098	

The numbers in brackets are percentages.

Adenoids and other causes of Nasal Obstruction.

These, in their effects, produce results as to mouth breathing of still more pronounced a nature than enlarged tonsils, and in the case of adenoids, the interference with mental power is at times very marked. The mental alteration entails lack of concentration and attention, with consequent forgetfulness. The obstructive character of the ailment on the other hand interferes with hearing, and may lead to disease of the ear, as well as the other defects cited in connection with enlarged tonsils. The incidence of adenoids and other nasal obstruction was found amongst 5 per cent. of the boys and 2.2 per cent. of the girls ; and in all cases severe enough to require active surgical treatment, the parents of the children were written to, while the need for special attention to breathing and other physical exercises when in school was explained to the teachers. One other observation has to be added, that to ensure that the child who has been surgically treated is broken off the acquired habit of mouth breathing, careful attention to the suitable school exercises is essential, for some time after return to school.

Enlarged Glands.

One function required of the lymphatic glands scattered throughout the body is that of acting as the first line of defence which the system can employ against the onset of all disease

When the lymphatic glands are so called upon, this activity is shown by the enlargement which takes place in their size, and as when quite normal such glands are not palpable, the fact that they can be perceptible to the touch demonstrates that they have been called upon to resist the entrance of disease. When it is stated that, caries of the teeth, skin disease on the head or neck, pediculi in the hair, together with enlarged tonsils and adenoids all entail activity on the part of the lymphatic glands in the neck, then the prevalence of these defects amongst school children explains the fact that 80 per cent. of both boys and girls had " palpable " glands. Some of those with much enlarged lymphatic glands suffered, as is shown later, from Tuberculosis.

In addition to the lymphatic glands in the neck, the thyroid gland is also situated there, and it was found to be markedly enlarged in 177 cases. The significance of this enlargement is outside the province of school administration.

External Eye Diseases, including Squint.

That children suffering from these diseases were not numerous will be seen from this table :—

	AGE LAST BIRTHDAY.										TOTAL	
	3		4		5		12		13			
Number examined—	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.
Boys	176		358		625		799		113		2,071	
Girls		155		361		591		804		116		2,027
Number suffering from—												
External Eye Diseases	7	8	16	19	26	30	42	44	5	4	96 (4·6)	105 (5·1)
Squint	4	1	8	7	17	11	13	27	1	2	43 (2·)	48 (3·2)

The numbers in brackets are percentages.

Of the external eye diseases found, blepharitis or inflamation of the eyelids was the most prevalent, and the need for efficient treatment being obtained for it when existent must be emphasised, as neglect thereof often results in the acuteness of vision being restricted.

Squint, when persistent, also requires active treatment, and the failure to secure such at an early age is only too frequently proved by the vision of the squinting eye being permanently impaired when the child reaches the upper school standards at 11 or 12 years of age. For this reason those children who suffered from squint and were not wearing glasses when inspected were referred to the Ophthalmic Surgeon. School work cannot be entirely exonerated from being one of the contributing causes in the production of squint amongst young children. The vision of children who squint is defective, and the squint is a proof of it, for in the effort put forth to see properly the strain involved produces the squint. Therefore, any work required of young children which calls for too great an acuteness of vision is to be deprecated on this account.

Vision.

The vision of all children inspected aged 12 and over was tested, and the results classified by the recognised standards, as follows :—

Age	Number examin'd		(*a*) Vision Normal $\frac{6}{6}$		(*b*) Vision Sub-normal $\frac{6}{9}$ to $\frac{6}{12}$		(*c*) Vision Bad $\frac{6}{18}$ to $\frac{6}{60}$		(*d*) Squint amongst groups *b* and *c*		(*e*) Glasses worn by groups *b* and *c*		(*f*) Children under groups *b* & *c* referred to Dr. Menzies	
	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.		
12	799	804	486	377	215	282	98	145	13	27	33	35	67	110
13	113	116	70	61	29	41	14	14	1	2	4	8	10	6
	912	920	556 (60·3)	438 (47·6)	224	323	112 (12·1)	159 (17·2)	14	29	37	43	75 (8·2)	116 (12·6)
TOTAL	1,832		994 (54·2)		567		271 (14·7)		43		80		191 (10·4)	

The numbers in brackets are percentages.

The number of children found with normal vision was higher than that found in the few schools dealt with in last year's report. This arises from the fact that taken on the whole, the vision of the children who live and attend schools outside the more densely populated parts of the borough is better than the vision of the children in the crowded areas. Overcrowding in a classroom, if of long duration, re-acts in the same manner. The children examined as " Special Cases " numbered 820, of whom 263 or 32 per cent. had defective vision. As these children were specially selected cases, and hence had vision defects of such a degree as to be noticeable by their class teachers, it is not surprising to find that 231, or 88 per cent. of them had " bad " vision. The group with " bad " vision included all those whose sight was below $\frac{6}{18}$ by Snellen's Test Type, $\frac{6}{18}$ is the technical equivalent for vision which is so impaired as to be a marked physical defect, $\frac{6}{6}$ being the equivalent for normal vision. By the methods of testing vision which are practicable for school purposes it is impossible to detect amongst the " bad " vision children those whose defect is due to spasm of the muscle of accommodation, such can only be found by special methods, hence, as will be seen in Dr. Menzies' report under Treatment, a proportion of such cases were found. 444 children were referred to Dr. Menzies for examination and the prescribing of glasses, these included all cases of " bad " vision and of persistent squint, who were not already provided with glasses, along with those whose glasses were found to be unsuitable.

The methods adopted for dealing with defective vision will be found under Section E.

Ear Conditions and Hearing.

The facts taken note of in examining the children have been, as regards the ear, whether the ear is free from defects, or if not, is the defects due to excessive accumulation of wax or to purulent discharge ? and as regards the hearing, is the child slightly deaf, so deaf as to be handicapped at school, or possessed of good hearing These facts have been correlated together :—

	AGE LAST BIRTHDAY											
	3		4		5		12		13		TOTAL	
	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.
Excessive Wax	2	2	12	5	37	27	82	98	15	9	148 (6·6)	141 (7·)
Discharging Ears	...	1	3	...	5	3	4	6	2	1	14 (0·6)	11 (0 5)
Slightly Deaf	...	...	1	...	11	17	10	12	7	1	29 (1·4)	30 (1·5)
Deaf	...	...	...	...	1	...	1	2	...	2	2 (·09)	4 (·1)
Good Hearing	176	155	357	361	613	574	788	790	106	113	2,040 (98·5)	1,993 (97·4)
Number examined ...Boys Girls	176	155	358	361	625	591	799	804	113	116	2,071	2,027
TOTAL	331		719		1,216		1,603		229		4,098	

The numbers in brackets are percentages.

It may be pointed out that, although only 0·6 per cent. of the boys and 0·5 per cent. of the girls had purulent discharges from their ears, the percentages with slightly defective hearing were 1·4 per cent. and 1·5 per cent respectively.

Those so deaf as to be kept back at school constituted a very small proportion of the whole, while it was only amongst the children examined *re* school attendance that one child was found who required institutional treatment.

The slight deafness discovered unaccompanied by any detectable local ear disease was generally due to nose and throat defects, or consequent upon infectious disease. Where operative measures have removed the cause of temporary dull hearing, special care with reference to breathing and physical exercises is of importance, and because of the tendency which the presence of adenoids and other forms of naso-pharyngeal obstruction have of giving rise to ear complications and deafness, the importance of curative treatment being sought at once becomes evident. Similarly, because excess of wax in the ear, when it hardens, may give rise to trouble sooner or later, its presence was notified to the parents for treatment.

Speech.

As the power of speech is incompletely developed in many children under five years of age, no attempt was made to estimate the faculty in such children. That, the defective articulation existing amongst the five-year-old children was due to delayed development of the power of speech, was shown by the few found at 12 years of age suffering in the same way. In the later age group, the defect arose from some associated physical condition such as cleft palate or nasal obstruction, which prevented special teaching methods having the desired effect.

The following summary gives the distribution of the conditions :—

	AGE LAST BIRTHDAY						TOTAL	
	5		12		13			
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Defective articulation	22	13	8	4	...	...	30	17
Stammering	...	1	7	...	...	...	7	1
Normal speech for age	603	577	784	800	113	116	1,500 (97·5)	1,493 (98·8)
Number examined ....Boys	625		799		113		1,537	
Girls		591		804		116		1,511
TOTAL	1,216		1,603		229		3,048	

The numbers in brackets are percentages.

Stammering.

The children showing this defect were not numerous at the ages inspected, others were found amongst the " special " cases, so that during the year 43 children attended the special class for children with defective speech.

As those who stammer and those who stutter were the children for whom the class was originally started, it has been called the Stammering Class, but very good results have followed from including therein the children who had defective speech from other remediable causes.

" Stammering is a spasmodic arrest of utterance." It is brought about by inco-ordination between the articulatory, respiratory, and mental brain centres. The stammerer has no lack of intellectual power in simple cases, only one of co-ordination.

" Stuttering consists in spasmodic repetition of initial syllables of words," and the spasms may involve the greater part of the muscular system, for the time being. The origin of the stutterer's deficiency lies mainly in imperfect breathing by which the spasmodic reflex is set up. Both these speech defects are much more pronounced when associated with feeble-mindedness.

Mental Condition.

In studying the mental capacity of school children for administrative purposes, the selection of a classification presents many difficulties, and the simple one chosen at the initiation of the work gives scope for amplification, if need be.

School children may be divided into two groups, those mentally capable of being instructed by the routine methods of the curriculum, and those who are feeble-minded. A large proportion of the children belong to the former group, although their intellectual powers may range from

" very intelligent or clever " to " dull." To endeavour to subdivide the children of average intelligence in this large group into various classes serves little practical advantage. It is in the small group of feeble-minded children that most can be done as a result of medical inspection.

Feeble-minded Children.

The accurate estimate of a child's mental power can only be ascertained by the compleet co-operation of the teachers in the work of medical inspection, for, so many factors must be considered and proportioned that to place a feeble-minded child in its correct educational position calls for a series of close observations. Hence the teacher's daily contact with such a child enables him or her to give most essential history to supplement the doctor's observations at the time of the inspection.

Feeble-minded children may be divided into two primary and two secondary divisions, *i.e.* :—

A.—PRIMARY.	B.—SECONDARY.
i.—" Backward " children	i.—Educable.
ii.—Mentally defective children.	ii.—Non-educable.

The following summary gives the primary divisions :—

	AGE LAST BIRTHDAY.						TOTAL	
	5		12		13			
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Feeble-minded Children—								
i.—Backward	4 (0·5)	5 (0·8)	9 (1·1)	5 (0·6)	...	...	13 (·8)	10 (·6)
ii.—Mentally Defective	2 (0·3)	...	1 (0·1)	1 (0·1)	...	...	3 (·2)	1 (·06)
Number examined Boys	625		799		113		1,537	
Girls		591		804		116		1,624
TOTAL	1,216		1,603		229		3,161	

The numbers in brackets are percentages.

The lack of mental capacity in the backward child arises from a deficiency in the quality of its intellectual centres, and the deficiency can be best dealt with by suitable instruction in a special class for such children.

The mentally defective group of children must be further classified under, educable, and non-educable, the former being fit candidates for special schools and the latter only suitable for permanent institutional supervision. Amongst the " special " cases seen, feeble-minded children were also found, with reference to whom and to the mentally defective in the summary, further observation is required to correctly classify them for educational purposes.

Heart and Circulation.

Heart.

The presence of grave disease of this organ did not exist to any large extent. Organic disease was found in only ·3 per cent. of the children of 5 years old, ·9 per cent. of those of 12, and ·4 per cent. of those of 13 years, while only one case, or ·07 per cent. of congenital heart defects existed. The detection of these weaknesses is important, as in the interests of the children's future health, a modification of drill and physical exercises is called for in school. In the majority of the cases seen during the inspections, the parents of the children were already aware of the condition.

Anæmia.

Anæmic conditions attributable to some of the many defects which give rise to them were found in association therewith, but seeing that the anæmia was the result and not the cause, all such cases have been grouped under the defect that was the exciting agent in its production.

Lungs.

It is rare to find a child attending school who suffers from any acute lung disease, all such cases are too ill to be present. Slight bronchitis was found in ·6 per cent. of the children of 5, and ·1 per cent. of those of 12 years of age. No cases of Pulmonary Tuberculosis or Phthisis were detected during the routine inspection ; the incidence of the disease amongst school children as ascertained from medical certificates is given under Tuberculosis.

Nervous System.

Functional disturbances of the nervous system giving rise to headache were the most frequent abnormalities found. Amongst the children of 12 and 13 years of age examined, 8·1 per cent. and 7· per cent. respectively, suffered in this way. The cause from which this trouble arose was eye-strain, attributable in the majority of cases to defective vision.

Organic nervous diseases were found amongst 0·5 per cent. of the children of 5, and 0·1 of those of 12 years old. Infantile Paralysis was the most common one, with the loss of power and function associated with the ailment.

Tuberculosis.

The occurrence of tubercular disease has been classified according to the anatomical part affected as follows :—

	AGE LAST BIRTHDAY.						TOTAL	
	5		12		13			
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Bone	...	1	6	6	...	1	6 (·3)	8 (·4)
Gland	...	...	5	2	2	...	7 (·4)	2 (·1)
Number examined—								
Boys	625		799		113		1,537	
Girls		591		804		116		1,624
TOTAL	1,216		1,603		229		3,161	

The numbers in brackets are percentages.

It is seen that while bone and glandular infection has been found, no lung infection was detected. To infer from this that no pulmonary tuberculosis existed amongst school children would be fallacious.

Advantage has been taken of another source of accurate information with reference to the incidence of all forms of tubercular disease amongst children of school age during the year, and the following summary has been compiled therefrom :—

	Abdominal	Bone	Gland	Meninges	Pulmonary	Skin	Tuberculosis Unclassified	Total	Estimated Population 3 to 15 years equals 20,136
Boys ...	...	5	1	...	7	...	2	15	Tuberculosis Incidence Rate per 1,000 equals
Girls ...	1	5	2	...	16	1	4	29	
TOTAL	1	10	3	...	23	1	6	44	2·1

This source is the certificates which the medical attendants of such children forward to the Education Committee with reference to school attendance, and as this information constitutes a valuable aid to caring for the health of the population as a whole, the cost of such certificates so far as tuberculosis is concerned, should not fall on the parents of the sick children solely, but merits the consideration of the Local Education and Health Authorities.

In those cases where the pulmonary tubercular lesion is of an actively infectious nature, confirmed by bacteriological examination, the attendance of the child at school is inadvisable, both in the child's own interests and those of all the other occupants of the school building, and the exclusion of such a child is always recommended. The other local forms of tuberculosis are not as equally infectious as the pulmonary, hence it is only when, from the situation and extent of the disease a child is physically unable to attend school, that in its own interests exclusion is required.

Rickets and Rickety Deformities.

This is a disease which arises before school age is reached, and is caused by general malnutrition, associated with improper feeding. Its prevalence is an index of the extent to which prejudicial influences, of which many are preventable, surround the developing child. The grosser deformities originating from the rickety state can be treated to a certain extent, but it is only by its prevention during infancy that the signs of the prolonged mal-nutrition, shown by the deficiency found in the growth of the children, can be scientifically combated.

Classified for age and sex the incidence of the disease was found to be :—

	AGE LAST BIRTHDAY.										TOTAL	
	3		4		5		12		13			
	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	Boys	Girls
Rickety Deformities—												
Bow-leg	10	10	10	5	9	8	3	5	1	...	33	28
Knock-knee	...	1	3	...	9	8	2	1	...	1	14	11
Rickety Chest	1	3	1	3	12	5	3	2	...	...	17	13
Other Forms	2	...	3	3	...	...	...	...	...	...	5	3
Number suffering from Rickets	13 (7·3)	14 (9·)	17 (4·7)	11 (3·)	30 (4·8)	21 (3·5)	8 (1·)	8 (·9)	1 (·8)	1 (·8)	69 (3·3)	54 (2·6)
Number examined—												
Boys	176		358		625		799		113		2,071	
Girls		155		361		591		804		116		2,027
TOTAL	331		719		1,216		1,603		229		4,098	

The numbers in brackets are percentages.

It is seen from the summary that, while of the children aged 3 years 7·3 per cent. and 9 per cent. suffered from deformities due to Rickets ; at 5 years of age the percentages were 4·8 and 3·5 respectively. Further, at 12 and 13 years, the deformities had almost disappeared, but the prolonged mal-nutrition co-existant with the disease remained, as is shown by the relative low standard reached in both height and weight at these ages. The rickety state predisposes to dental caries, so that both these factors combine with others in producing the faulty growth.

Other Deformities.

The following is a classification of the other chief deformities found to exist in addition to the rickets ones :—

	AGE LAST BIRTHDAY.										TOTAL	
	3		4		5		12		13			
	B.	G.	B.	G.	B.	G.	B.	G.	B.	G.	Boys	Girls
Cleft Palate	1	...	...	...	1	...	2	1	...	...	4 (·2)	1 (·04)
Deflected Nasal Septum	1	...	5	1	4	2	31	17	7	3	48 (2·3)	23 (1·1)
Spinal Curvature	...	...	...	...	1	2	3	4	...	...	4 (·2)	6 (·3)
Talipes	...	...	1	2	1	...	1	1	1	...	4 (·2)	3 (·14)
Number examined—												
Boys	176		358		625		799		113		2,071	
Girls		155		361		591		804		116		2,027
TOTAL	331		719		1,216		1,603		229		4,098	

The numbers in brackets are percentages.

These have been selected for special note as each of them produces effects upon either the child's health or educative capacity.

Cleft Palate.

This congenital defect should not be found to exist amongst children of 12 years of age, proper surgical treatment ought to have been sought before such an age was reached, for not only does the defect handicap the sufferer in finding a vocation in life, owing to the resultant physical disability, but the incompleteness of the nasal cavity interferes with normal breathing.

Deflected Nasal Septum.

This deformity gives rise to mouth breathing and is one of the causes of the " other nasal obstruction," discussed under adenoids. When present to a marked degree, mouth breathing results with its concomitant ill effects of the child's health.

Spinal Curvature.

The cases here given are only those having their origin in disease of the spine, tubercular in nature. That such children require special consideration as regards seating accommodation, suitable work and physical exercises, is at once apparent.

Talipes.

The several varieties of club-foot met with are usually the result of infantile paralysis. The sufferer's health is interfered with in so far as the power to take exercise and engage in drill is more or less restricted, while if left untreated, a serious handicap is placed upon the child, when in the future a means of livelihood has to be sought.

Infectious Diseases.

At the time of the routine inspection in each school only eight cases of infectious disease were found. These were :—Chicken-pox, 1 boy ; Mumps, 5 boys and 1 girl ; Septic throat, 1 girl. The consideration of the occurrence of infectious disease in epidemic form will be found under Section F, while contagious skin diseases have been already discussed.

SECTION E.

Methods of Treatment adopted.

General Treatment.

Children requiring any specific medical or surgical treatment are advised to obtain the same from their family doctors.

Preventive Treatment.

During the year a special report was submitted to the Education Committee in which was detailed a scheme for the treatment of certain of the defects reported upon last year. As this report will give the best review of what is being done to remedy some of the conditions found, it is now appended.

Special Report, May 19th, 1909.

" On page 21 of the Annual Report, it is pointed out, ' that it is in :—

" 1.—Cleanliness ; 2.—The condition of the Teeth ; 3.—The condition of the Nose
" and Throat ; 4.—The deficiency in Eyesight
" that there is the greatest and most pressing need for improvement."

" The scheme now presented to you deals with the first three of these conditions."

" Defective eyesight has been already provided for with reference to treatment, while " the recommendations laid before you, from time to time, as to the lighting, and seating " arrangements in the several schools inspected, will, when carried out, serve to reduce the " eye strain placed upon the children."

" After due consideration, your Medical Officers have based the following scheme on the " methods of preventative medicine, rather than on the lines of direct treatment, such as " would be afforded by a school clinic. We are of opinion, that very much can be accom- " plished by preventive methods, and that, the educating of the people, as a whole on these " lines, will do more towards diminishing, in the future, the incidence of the defects complained " of, than, the actual present treatment of the defects by the Local Authority, would secure. " Let the provision of present medical treatment be left to the parents."

" The defects found, in the nose and throat, in the decayed state of the teeth and its " results, taken in conjunction with the presence of other disease germs in these parts (as has " been shown by bacteriological work elsewhere) demonstrate the desirability of preventing " the spread of such infection from child to child, so far as is practicable in Elementary Schools. " We would point out, that the present system of loose pencils, pens, paint brushes, rubbers " and rulers, facilitates the spread of such infection. A recommendation has accordingly been " made to provide against this."

" Your Medical Officers desire to obtain the information which will be available from " the Nurses' work, under section A3 of this scheme, before recommending the exercise of the " full powers afforded to the Committee by the Children's Act."

The Scheme.

" A.—The Scholars."

" 1. That Card M.I. 9 be printed and circulated, so that children attending the " Elementary Schools, may take a copy home to their parents."

" 2. That, the head teacher be requested to explain, as occasion presents itself, the " several points on the card, to each class in turn. This proceeding to be adopted, till such " time, as Systematic Instruction in Personal Hygiene, is included in the School Time Table."

" 3. That the Medical Officer organise the Nurses' work, to include the inspection of " children (girls in particular) at all school ages, with reference to cleanliness—this to be done, " so far as is practicable with the present staff, after the routine inspection at certain age " periods has been carried out."

" 4. That the Medical Officer, draw up small cards, M.I. 10, to be used by the Nurses, " giving directions to parents, as to how children's heads can be kept clean."

" 5. That Head Teachers be requested not to send any child to the Public Baths who :—

" *a.* Has been found verminous by the School Nurse, till the condition complained " of, be remedied."

" *b.* Has any form of skin disease."

" 6. That the present system of loose pencils, pens, paint brushes, rubbers and rulers, " be replaced by the supply of individual metal school boxes, in which each child will keep " the above articles, the box being labelled with the child's name."

" B.—THE SCHOOL PREMISES."

" 1. The details of the plan recommended for cleaning (see Cleanliness of Schools).

" 2. The provision of an inexpensive spray bath apparatus in one or two of the schools " in the crowded areas of the Borough, is suggested."

" C.—SYSTEMATIC INSTRUCTION IN PERSONAL HYGIENE."

" Should the Committee decide to provide such instruction, the Medical Officers will " prepare a Syllabus for their consideration."

" Under such a syllabus will be the most suitable opportunity to consider the proposed " institution of ' Tooth-brush drill ' in School."

Card to Parents, M.I. 9.

Medical Inspection having shown that a large number of school children suffer from complaints which are preventable, the Education Committee earnestly desire to draw the attention of parents to the following points :—

I.—CLEANLINESS.

This is essential to soundness, as children's health is injured by dirt and their education delayed. Children naturally play with dirty objects, hence there is all the greater need for daily attention to this matter. Children readily communicate their ailments one to another, and to prevent this is most important.

(*a*) CLEANLINESS OF THE HEAD.

It is not natural, as some think, for children to have " nits " in their hair, nor is it healthy ! Many school children found spotlessly clean and tidy in every other respect are afflicted with these pests.

If your child suffers in this way, carry out carefully the method of cleansing approved by the Education Committee. A card, giving the necessary directions, can be obtained on application to the School Nurses, at the Education Office.

When there is difficulty in keeping a child's head clean, the hair should be cut short and kept short. This is important for girls as well as boys.

Combs and brushes should be cleansed, by washing in vinegar and then dipping them in very hot water for a few minutes.

Caps, hats, coat collars, dress and underclothing, neck bands, all require constant cleaning, when a child suffers from vermin. Iron, with a hot iron all of these, before washing, to destroy the " nits " or vermin which may lurk therein.

(*b*) THE EARS.

All the outer part of a child's ears require daily washing, to prevent the accumalation therein, of dirt or " wax." Do not use a hair-pin or any sharp object to put into the ears. Attention to these simple directions would prevent many cases of incurable deafness and brain disease.

(*c*) THE EYES.

The omission to remove particles of dirt or " matter " from a child's eyes, is often followed by disease of the eye-lids or eyes, which injure the sight permanently. If simple cleansing does not remove the trouble, then seek medical advice at once.

(*d*) EYESIGHT.

Attention to the condition of children's vision is of the utmost importance. Do not allow your child to sit indoors reading for several hours by artificial light. If your child complains much of headache, or aching eyes, have medical advice, as defective vision is a frequent cause. When the Medical Officer sends notice with reference to your child's eyesight at school, do not fail to attend to the same.

(*e*) THE NOSE.

Children, specially infants, catch cold readily and have a nasal discharge. Dust, grit, and bad ventilation in the home make this worse. The discharge may poison the eyes and cause inflammation therein. Therefore, *all* children should be given a handkerchief at home before coming to school each day.

A *clean* rag will do just as well ; or *clean* pieces of paper would be much better than nothing at all.

(*f*) SKIN DISEASE.

All forms of skin disease among children, are spread, made worse and more difficult to cure, by want of attention to simple cleanliness. A good wash with soap and water will improve the child's general comfort. Ringworm and the other severer forms of skin disease are most difficult to heal when neglected at the start, therefore, as well as keeping the child thoroughly clean have medical treatment for these diseases at the commencement. Don't wait till half the child's head is covered by the disease.

(*g*) CLEANSING OF THE TEETH.

Daily washing of the teeth would prevent much of the serious decay found by the Medical Officer—Only 17 infants and 12 senior scholars in every 100 children examined had sound teeth.

If parents cannot afford a tooth brush for each of their children—and no child should use another's brush—rubbing the teeth night and morning, with a clean cloth rolled round the finger and moistened with water, and after that, rinsing the mouth out with water, would secure improvement and preserve many teeth that now decay.

It is most needful to take care of the " milk " or 1st set of teeth of infants, for, if they decay, the decay affects the 2nd set seriously.

Clean teeth and clean gums influence the health of children for good, equally as much as clean hands and faces.

II.—CLOTHING AND BOOTS.

It is a mistake to overload a child with clothes. Too many garments keep children in bad health, quite as much as too few garments.

Children are active and take a great deal of exercise, consequently, if they are overclothed, they get too hot and easily catch cold. This applies equally to girls and boys, and so far as the clothing on the chest and body is concerned, four garments are adequate in either sex. The chief essential being that the inner-most one be woollen.

Whether a child wears boots, clogs or shoes, the important point to attend to, is, to have the feet kept dry and warm.

III.—FRESH AIR, SUNSHINE, GOOD FOOD, AND PLENTY OF SLEEP.

These four things contribute more than any others to the health and growth of children. All young life requires sleep, food, sunshine and fresh air, and children are no exception to that law of nature. Therefore the more of these four mainstays of life children enjoy, the healthier, the happier and the bonnier they will become.

SLEEP.

The educational capacity of a child's brain is governed considerably by the amount of sound sleep enjoyed. Do not allow your child to sit up late at night, go to late evening entertainments, or other sources of undue excitement. Endeavour as far as possible to let the child have the hours of sleep suitable to its age, in a room with an open window, absolute quietness, darkness, and plenty of bedclothes.

YEARS OF AGE.	HOURS OF SLEEP.
4 to 8	12 hours
9 to 12	11 ,,
12 to 14	10 ,,
14 to 20	9 ,,

If, from want of care for their own children's health some parents neglect these simple precautions, the Education Committee must press for attention thereto, in the interests of the clean, tidy, and healthy children, whose parents give them such constant care.

Card M.I. 10, Cleansing of Verminous Heads.

PRIVATE NOTICE.

Unless proper precautions are constantly taken, there is difficulty in keeping a child's hair quite clean and free from " nits."

The School Nurse has examined your child
and finds that you experience this difficulty.

The directions given on the back of this card will render the head clean within a week, and the Committee request that you will give the matter continuous attention in the future to prevent its recurrence.

Date...

REVERSE OF CARD.

CAUTION.—Use the paraffin during the day when possible, and not near a fire or a naked light.

1. Wet the hair thoroughly with Paraffin Oil, and keep wet for half-an-hour.
2. Then wash the whole head with warm water and disinfecting soap.
3. Half-an-hour after washing, comb the hair very carefully with a fine-toothed comb wet with vinegar, to remove the " Nits."
4. Repeat this treatment daily for a week.
5. The hair should be cut short and kept short. This is important for girls as well as boys.

School Nursing.

The appointment of fully trained nurses to assist in the work of medical inspection has enabled much useful work to be done. The results of that work, as carried out under the scheme just quoted, have been given already and it now remains to make some excerpts from the reports made to me by the School Nurses.

> One Nurse says :—" I think that perhaps the hardest part of the work has been an " attempt to instil into parents and children some idea of personal cleanliness."
>
> " This has been, still is, and to some extent will be for some time to come, a hard fight. " For some reason, even amongst otherwise perfectly clean people, a child with nits in her " hair is not an uncommon sight, while amongst negligent parents it is considered in the " course of nature, and a thing that it is quite hopeless to try and prevent."

" One has learned two things from home visiting ; (1) that as a rule the mother who " is angry and inclined to be abusive on the nurse's first visit will eventually have her child " as clean as any ; (2) that the calm placid woman who agrees with all one says gives her " promises lightly, and as lightly breaks them. The method of cleansing the hair which is " recommended is readily used by the parents, and mothers express their appreciation of " such a simple and cheap treatment as lamp oil for the hair, after all the ' tens of shillings ' " they have spent on other so-called remedies, which seemed to make matters worse. Other " mothers resent the receipt of a card regarding the condition of their children."

" In one case the parent objected in the following terms :—' If you'll teach our " Matilda Jane more about cookery and less about other things there wouldn't be any need " for doctors and nurses.' Matilda Jane, I might remark, was then three years of age."

The other Nurse reports :—" The School Nurse is not invariably made a welcome " visitor, but if she can show the parents that her business, and what she really wants to do " is to help the children to a healthier and happier life, she can very often persuade them " to pay more attention to matters of health."

" In visiting the homes of the scholars one comes to realise the difficulties under which " some of these people bring up their children. Much valuable work can be done by School " Nurses in carrying light and knowledge as to the care of children to these homes, and in " encouraging the sometimes overburdened, and sometimes careless and unenlightened " parents to take greater and more intelligent care of these little ones."

These extracts are quoted to show the attitude of some parents to the new part of school work created by medical inspection, and also to present some of the difficulties which the School Nurses encounter in their daily duty.

Treatment of Defective Eyesight.

By the appointment of an Ophthalmic Surgeon to examine and prescribe for children referred to him by the School Medical Officer, the Education Committee have made provision for dealing with a defect which in all its forms seriously interferes with school work, and one form of which, myopia, may be produced or aggravated by school work. And to lessen, in the future, the production of such myopia, alterations have been suggested to and carried out by the Education Committee in the lighting (natural and artificial) and seating arrangements of many schools. Further, when those portions of the school curriculum which call for undue eyestrain have been modified or deleted for certain ages, still further preventative treatment will have been utilized. For instance, it was pointed out in last year's report that sewing lessons for children under 7 years of age were undesirable and injurious to their eyesight. That this and other branches of school work increase the degree of myopia in proportion to the length of time children are at school is shown by the following summary, where it is seen that this defect existed in a greater proportion of children between 10 and 15 years of age than in the younger ones, and that girls were rather more affected than boys.

The cost of the examination by the Ophthalmic Surgeon is defrayed by the Education Committee, but the parents of the children are asked to purchase the required spectacles, which are supplied through the Education Office, and can be had at reduced prices. Only in exceptional cases are the glasses supplied free of cost to the parents.

Of the 444 children asked to come to see Dr. Menzies 362 did so, while 82, or almost 19 per cent. neglected to make use of the facilities offered to them.

The subjoined summary gives the age distribution of all the children who came for examination, while following it is a table giving the eye defects found to exist amongst them. From this table it is seen that in over 96 per cent. the defective vision was due to errors of refraction, in 3 per cent. to diseases of the eyeball, and in ·5 per cent. to spasm of accommodation.

Dr. Menzies' report discusses the significance of these conditions.

Age Summary of Eye Cases.

	Age Last Birthday.													Total
	3	4	5	6	7	8	9	10	11	12	13	14	15	
Number examined ...	1	6	15	15	15	14	27	17	32	166	50	3	1	362

Defects found amongst the Eye Cases.

Defects	Age and Sex						All Ages of each sex		Total
	3 and 4 years		5 to 9 years		10 to 15 years				
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
I.—Refraction Errors—									
Hypermetropia	3	1	16	16	22	48	41	65	106
Myopia	...	...	2	3	14	15	16	18	34
Simple and Compound Hypermetropic Astigmatism	...	2	11	17	41	55	52	74	126
Simple and Compound Myopic Astigmatism	...	1	...	5	10	18	10	24	34
Mixed Astigmatism	...	...	2	6	17	24	19	30	49
Total Number with Refraction Errors	3	4	31	47	104	160	138	211	349
II.—Diseases of the Eyeball—									
Fundus Disease	...	...	1	1	4	2	5	3	8
External Diseases (Nebulœ, etc.	...	...	...	2	...	1	...	3	3
III.—Spasm of Accommodation	...	...	...	...	...	2	...	2	2
Total—All Defects	3	4	32	50	108	165	143	219	362

In addition to the diseases of the eyeball classified under II. there were 64 cases of Squint, 63 Convergent and 1 Divergent ; 11 of Fundus Disease and 27 of External Diseases, all of whom are classified in the table under the Refraction Error, from which they suffered.

Dr. Menzies' Report.

During the year 362 children have been examined on account of bad eyesight with a view to improving their efficiency. Of these, 349, or 96·4 per cent. were found to owe their defect to some error of refraction. 11, or over 3 per cent. suffered from various eye diseases, requiring medical treatment and did not need glasses, while in 2, or about ·5 per cent. the cause of the defective vision was found to be of a temporary nature. The children of the third group suffered from spasm, or cramp of the muscle of accommodation, resulting from over-use and producing a fictitious short-sight. In such cases glasses are not only unnecessary, but may even be harmful, and the difficulty is easily put right by rest and a little treatment.

It will be noticed that only seven children of ages 3 and 4 have been examined. The explanation of this lies in the fact that such young children cannot be properly tested as to their acuteness of vision, and are only sent for examination with a view to having spectacles in case of squint. The predisposing cause of the common form of squint in children is invariably an error of refraction, and if spectacles are prescribed early enough, not only is the squint cured as a rule, but the sight of the squinting eye is saved. If glasses are not provided in the early stage, the squinting eye deteriorates, and, even if it is put straight by operation later on, it probably never recovers useful sight.

In all, 64 of the children examined were found to suffer from squint, 19 had disease of the fundus, or back of the eye, and 30 had various external diseases or defects.

Inasmuch as myopia or short sight is a defect which tends to be progressive, and which is aggravated by unsuitable conditions, such as bad lighting, bad print, or improper desks, a special investigation has been made as to the schools from which the myopic children were drawn. It was found, however, that the numbers from each school were too small to found any general conclusions upon. But the total numbers indicate that there may be some removable cause which might be investigated in future years. Thus, at ages 5 to 9 there were 18 cases of myopia, myopic astigmatism and mixed astigmatism out of 78 defective cases examined (1 in $4\frac{1}{3}$), whereas at ages 10 to 15 there are 98 with myopia, myopic astigmatism or mixed astigmatism out of 264 examined (1 in $2\frac{2}{3}$). Further, out of a total of seven cases from the Central School, four, or over 50 per cent. are myopic. These latter are of course amongst the oldest and most studious children examined, and one would expect a higher proportion of myopic cases among them.

Spectacles have been prescribed for 319 children out of the 349 who had errors of refraction. In about two-thirds of the cases the defect was found to be hypermetropia or hypermetropic astigmatism. In such cases the focus is too distant, and near vision especially involves an excessive, harmful and often painful strain. Thus reading and writing are carried on with difficulty, and often with aching of the eyes and head, and, unless provided with glasses, the child tends to shirk study as much as possible. Moreover, a child with hypermetropic astigmatism holds his book too close to the eyes in order to see as plainly as possible, and the overstrain due to this faulty position is the more fertile cause of true short sight.

Unfortunately, many cases of simple hypermetropia are not detected by the ordinary methods of testing because the vision is often excellent, and the only drawback is the aching consequent on the overstrain.

Rather over one-sixth of the total cases were cases of myopia or myopic astimgatism, in which the focus of the eye is too short, and the child, if unaided by glasses, is unable to see blackboards, maps, etc., and suffers in consequence. The remaining cases, less than one-sixth of the total number, were found to have mixed astigmatism, which for practical purposes is to be regarded as a form of myopia.

It is thus obvious that the provision of glasses in these cases should remove one cause of dislike for study, convert many apparently stupid children into efficient pupils, and remove a serious difficulty from the arduous work of the teacher.

J. A. MENZIES.

The measures thus provided by the Education Committee for the treatment of defective eyesight are neglected by the 19 per cent. of the children already mentioned who did not come to be examined, while the prescriptions provided by Dr. Menzies have been still more unappreciated and unused. 60 per cent. of the parents have provided their children with glasses, while 40 per cent. have neglected to do so.

The School Nurses have visited all those who have not taken advantage of the facilities offered to them, and they report that while one-third are unable to afford the cost, the other two-thirds made “ various excuses.”

Your Medical Officer would point out that one remedy for this neglect on the part of those who “ make various excuses ” is provided under the Children Act, 1908.

SECTION F.

The Incidence and Treatment of Infectious Diseases from the School Aspect.

Of the non-notifiable zymotic diseases, Measles, Mumps and Whooping Cough were the most prevalent during the year, occurring in epidemic form in several schools.

Of the notifiable zymotics—Scarlet Fever assumed epidemic proportions amongst the scholars of one school, while in another school more than one case of Diphtheria occurred about the same time.

Measles.

Three schools were principally associated with the prevalence of this disease. Two of them were on the furthest outskirts of the area in scattered districts, and many of the children affected lived outside the Borough, while the third was also on the outskirts and drawing children partly from the same area as one of the others. Owing to the wide-spread nature of the infection in the two former, the whole school was recommended to be closed in each case for a fortnight. In the latter instance the Infant Department only was so dealt with.

Mumps.

The children of six schools were affected by this disease with epidemic severity, chiefly during the months of March, April, May and June. All children suffering from the disease were excluded from school, together with all infants coming from infected houses until free from infection.

Whooping Cough.

In one school a considerable number of children in the Infant Department suffered from this disease simultaneously, 21 being absent at the same time. The sufferers were all excluded from school till free from the disease and infants treated as in the case of Mumps.

Scarlet Fever.

Among the children in one school on the outskirts of the Borough this disease occurred very persistently for three months during the autumn, 24 cases in all being notified. The school was closed for two days, and the premises disinfected by fumigation in the early stages of the epidemic and examinations made of the children in the school. All were inspected in the first instance, and afterwards at intervals, those who had been away ill were seen on their return. No infectious child was found in attendances at school, one suspicious case was excluded and kept under observation by the family doctor, till it was possible to exclude scarlet fever as the cause of his illness. From careful observation of the incidence of the disease it was concluded that outside influences, and not school contacts, were the contributing causes to the prolongation of the epidemic.

Diphtheria.

Two cases of diphtheria having occurred in one school, a special investigation was made, and it was found that both children were in the same class and had ceased attendance within 24 hours of each other. Enquiries in the class made at the time did not show any other child with suspicious throat symptoms, nor any in the whole department. 17 days after the second case occurred, the head teacher notified that another child in the same class was absent with sore throat. The school was visited at once and this child was found in attendance, supposed to have recovered. Her condition called for prompt exclusion and the attendance of her family doctor. He had immediate bacteriological examination made which showed, that she suffered from diphtheria.

The value of the bacteriological examination in dealing with this disease in school is thus demonstrated, and the adequacy of prompt exclusion of a suspicious case in preventing a further outbreak. The interval of 17 days stated to have elapsed between the last attendance of the second case and the illness of the third one precludes the likelihood of the infection having been communicated from the one child to the other.

The value of the close co-operation of the teachers with the school doctor is thus further proved. They are in daily touch with the children and the prompt notification by them of any suspicious cases of infectious illness in school, when such exist in the homes of any of their scholars, affords the Medical Officer most necessary assistance in coping with epidemic diseases from the school aspect.

SECTION G.

Teachers and Pupil-Teacher Candidates examined during the Year.

13 teachers, 1 male and 12 females, were medically examined in accordance with the requirements of the Board of Education prior to their being recognised as Uncertificated Teachers. All of them were physically fit for the work.

Candidates for pupil-teacherships were also examined with the following result :—

Age	Number examined		Accepted unreserv-edly		Accepted, subject to attention to :— Teeth		Accepted, subject to attention to :— Eyesight		Total Number accepted		Referred back owing to Hearing		Rejected entirely owing to Eyesight	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
15	1	...	...	...	...	...	1	...	1	...	...	...	...	...
16	2	9	2	3	...	4	...	2	2	7	...	1	...	1
17	1	3	1	2	...	1	...	...	1	3	...	...	...	...
Total ...	16		8		5		*3		14		1		1	

* Two of these had teeth defective and are included in the previous column.

Those accepted subject to attention being given to certain defects of either teeth or vision, had the importance of the matter set before them, and the fact that persistance of untreated defects would militate against them at a future medical examination was fully explained. The one candidate rejected suffered from defects of vision which could not be removed, and was hence unfit for school work. For, it would be obviously unfair to the candidate, and prejudicial to the best interents of the teaching staff, to accept a candidate as a pupil-teacher who had such defects as would later on debar him or her from being passed as physically fit for fully trained teacher's work.

SECTION H.

Conclusion and Recommendations.

This report has been prepared on the same lines as were followed last year, but the fact that all the schools have been visited since then and corresponding age groups of children seen in each, has provided material, as was stated at the commencement, for a fuller consideration of the varied branches of the Medical Inspection of School Children, and a more complete treatment of the subject of School Hygiene.

Cleanliness.

Reference to the facts recorded in this report regarding cleanliness and the work of the School Nurses, will show that the procedure adopted by the Education Committee is producing the desired effect and that improvement has taken place, while a still higher standard will be reached as a result of the continued work undertaken by the School Nurses.

Care of the Teeth.

The condition of the children's teeth and the wide-spread occurrence of decay present a problem which is very complex. To recommend the provision of immediate curative dental treatment would not in your Medical Officer's opinion be the means of obtaining the greatest improvement until the way has been prepared for it by other measures. For, to provide the means to "fill" all the decayed teeth which a child has, without first instructing the child beforehand how to keep the mouth and teeth clean, would be misapplied expenditure, coupled with unsatisfactory results. Operative dental treatment will eventually be essential, but systematic instruction in Personal Hygiene is undoubtedly called for, as an indispensible preparation.

Teaching of Personal Hygiene.

The adoption of preventative measures, to many of the conditions found during the inspections, will be most productive of lasting improvement.

Increase of knowledge in matters of health is the most potent of such general methods of treatment, and with that end in view, the introduction into the school curriculum of a Syllabus on Personal Hygiene is essential. Such a Syllabus, including Lessons on Temperance as prepared by the Board of Education, was submitted to the Education Committee during the year and its adoption and routine use is strongly advised. For, it is only by training the children in these matters from early school age that a radical improvement will be effected amongst the children of the future.

Open-air School.

Another direction in which the application of preventative methods opens the way to increased health amongst certain groups of physically defective children is the combination of education and open-air treatment for the under-nourished, the rickety, the tubercular and other delicate children in the borough. It is not sufficient to provide meals alone for such children, the establishment of an open-air school is the only adequate method of improving their physique and so, of fortifying them to combat the prejudicial influences of their daily environment.

Seeing that the Local Authority has recently undertaken to exercise the powers afforded by the Education (Provision of Meals) Act, 1906, increased benefit would accrue to the under-nourished children by combining daily instruction in an open-air school with the good food and rest which form an essential part of its time-table. The rickety and tubercular children would be even greater gainers by the establishment of such a school, for, fresh air and good food constitute the basis of all satisfactory methods of fitting such children for their life's work, and the combination of physical and educational equipment would be secured by an Open-air School.

In conclusion I wish to take the opportunity of expressing my appreciation of the help and co-operation afforded by your Secretary and his staff, and by all the teachers concerned in the work. While my best thanks are due to the School Nursing Staff for the untiring energy, the tactful care and the sympathetic bearing with which they have discharged their manifold duties.

A. B. McMASTER,

Assistant Medical Officer of Health.

Preface.

To the Chairman and Members of the Health Committee of the County Borough of Rochdale.

GENTLEMEN,

In accordance with your instructions, I have now the honour to present to you a Report on an investigation as to the conditions of the milk supply of the County Borough of Rochdale. This Report is divided into five sections, with four appendices.

In Section I, the cowsheds are divided into three classes, Good, Fair, Bad; and the essential features which form the basis of this classification are fully described.

This is followed by a description and discussion of the general conditions prevailing in and around these cowsheds and dairies; and of the appliances and methods in operation in this district for carrying on the trade of dairyman and milk vendor; while at the same time these have been fully considered in so far as they are, on the one hand, in conformity with modern requirements for the production of a reasonably pure milk; or, on the other hand, militate or even prevent the attainment of this object.

A very full and tabulated description of every cowshed within this Borough will be found in App. A, which forms the ground-work of this Report.

As supplementary and illustrating this Section, App. B contains several sketches representing some of the different types of cowshed in this district; and for the purposes of comparison, App. C shows the plan and cross section of a model cowshed and dairy premises.

Section II introduces the question of milk in relation to health and disease —especially milk-borne diseases.

The first and minor portion discusses the important bearing of a good or bad milk supply on the general health and physique of any community; and especially on that important section—the infantile population.

The bearing of the milk supply on the work of lady health visitors, and the expediency of the expenditure on municipal milk depôts for the pasteurisation and sterilisation of milk, while at the same time not checking the source of pollution at the fountain head—the cowshed—are all briefly considered.

The subject of "summer diarrhœa" in children, and its association with impure food and milk, and filth conditions, falls well within the scope of this Report; and an epitomê of some of the recent bacteriological work has been included.

Then, in a brief historical sketch, the establishment of scarlet fever, diphtheria, and typhoid fever as milk-borne diseases are passed under review; while at the same time bringing into prominence some aetiological factors, and some recent bacteriological work of interest and practical importance, especially regarding "typhoid carriers."

The major part of this section deals with tuberculosis in relation to milk; and in this respect, of first importance are the conclusions issued in 1907, by the last appointed Royal Commission, regarding the identity of human and bovine tuberculosis, and the transmission of the latter to the human subject, especially children, through the medium of tuberculous milk.

These conclusions, and the valuable experimental work by which they have been extended and confirmed by many eminent Continental and British bacteriologists, have been discussed at considerable length. For, it is from the accumulation of such scientific evidence, we now believe that the usually accepted, but not proved, inhalation theory of tuberculosis is no longer tenable, and must be modified; and that tubercular infection through the ingestion of tubercular milk must receive more serious and practical consideration than heretofore.

Much of the experimental work I have divested of its scientific nomenclature, and stated in the language of ordinary every-day life, with the hope that this subject may not only arrest attention, but sustain the interest which the importance of the subject demands.

For, although it is nearly thirty years since the causal bacillus of tuberculosis was discovered, and although year by year our knowledge of the aetiology of this disease has gone on accumulating; this knowledge combined with experience, has taught us that, for the cure of tuberculosis, therapeutics and sanatoria have had as yet only a limited value, that prevention is better than cure, and that this disease is eminently within the domain of preventive medicine; yet, it is a notorious fact that so little has yet been done—so little yet achieved in this very field where preventive medicine is yet destined to achieve one of its greatest triumphs; and the day may come, when cases of tuberculosis will be as rare in England as cases of smallpox are to-day.

Section III deals with filth or dirt in milk; its sources and significance; and the unavoidable and permissible standard in a reasonably pure milk.

Section IV deals with some aspects of the bacteriology of milk; the nature, sources, and significance of the bacteria found in view of the establishment of a bacterial standard for impurities in milk.

Section V contains a short résumé of the chief legislative measures with some suggestions for the control of the milk supply; while App. D contains the chief provisions of the Milk and Dairies Bill as set forth in its memorandum; and an epitomê of the more important Sections of the Tuberculosis Order, 1909.

In preparing this Report it has been my constant aim, while treating of conditions as they actually exist, and as set forth in App. A, not to pursue a destructive policy, but, rather, on the other hand, by appealing to commonsense and reason, to suggest a constructive policy; and if possible to stimulate that spirit of scientific enquiry, which is so essential for the progress of any trade or industry. For I fear the agricultural industry, like many others, has too frequently been false to its own best interests by failing to take advantage of available science.

In conclusion, I avail myself of this opportunity to express my appreciation of the uniform kindness and support which I have received from the Chairman and Members of the Health Committee, since taking up my duties here as Medical Officer.

I also desire to acknowledge the work done by Mr. Whiteley and the assistant inspectors in carrying out the work of inspection. The sketches and plan of model dairy are from the pen of Mr. Duncan, assistant inspector, who also gave me considerable assistance in preparing this work for the press; while my colleague, Dr. McMaster, has frequently assisted me with many useful suggestions.

I have the honour to be
Mr. Chairman and Gentlemen,
Your obedient Servant,

A. G. Anderson

Medical Officer of Health.

Town Hall, September, 1909.

Contents.

SECTION I. Pages.

No. of Dairymen inside the Borough; No. of Dairymen outside the Borough; Method of Inspecting and Reporting 7

COWSHEDS.

Average Occupation, etc.; Division into Groups; External Conditions: Yard Paving; Dung Pits. Cubic Space and Overcrowding; Ventilation and Lighting; Use made of Ventilators; Cleansing of Cowsheds; Bedding; Feeding Tubs .... 7—11

CLEANLINESS OF COWS AND MILKING.

Cleanliness of Cows; Cleansing of Udder before Milking; the Milker and Cleansing of the Hands; Wet Milking; Milking Machines .... 12—13

WATER SUPPLIES AND DRAINAGE .... 13—14

DAIRIES AND MILK STORES; CHILLING AND STRAINING OF THE MILK; AND CLEANSING OF VESSELS.

Construction and Suitability of Dairies and Milk Stores; Milk Storage; Vessel Washing Accommodation, and Appliances; Hot Water Supply; Construction of Vessels; Chilling of Milk; Straining or Filtering the Milk; Notes on Appendix C (Model conditions) .... 14—17

SECTION II. MILK IN RELATION TO HEALTH AND DISEASE—ESPECIALLY MILK-BORNE DISEASES.

DISCUSSION ON THE IMPORTANCE OF A PURE MILK SUPPLY: Infant Feeding with Impure Milk; Bottle Feeding and Breast Feeding; Conditions which tend to Contaminate Milk; Health Visitors in Relation to Infant Feeding and Impure Milk; Municipal Milk Depôts: MILK-BORNE DISEASES—Zymotic Enteritis or Summer Diarrhœa, and Infantile Mortality; Summer Diarrhœa and Water Carriage System; Scarlet Fever, Typhoid Fever, and Diphtheria—Historical, Zymotic Epidemics, Typhoid Carriers: TUBERCULOSIS IN RELATION TO MILK—Scientific and Experimental Evidence; Post-mortem Evidence in Relation to Tuberculosis in Children; Prevalence of Tuberculosis in English Milking Herds; Evidence from Statistics of Registrar General; Discussion and Conclusions; Environment in Relation to Health and Disease .... 17—31

SECTION III. DIRT OR FILTH IN MILK.

SOURCES OF POLLUTION.—Human Sources; Dirty Milk Utensils; Air and Dust; Artificial Pollution; Flies; From the Cow. Significance of Filthy Milk; The Permissible and Unavoidable Sediment Content; Correlation of Filth and Microbes in Milk; Manchester Investigations; The Law and Local Authorities in Relation to the Elimination of Tubercular Cows .... 31—34

Contents—continued.

SECTION IV. BACTERIAL STANDARD FOR IMPURITIES IN MILK.

Pages.

The Bacteria on which the Standard is based; The Permissible and Unavoidable Bacterial Content; Chilling the Milk; Chief Sources of Bacteria in Milk; Yorkshire Investigations, Tables, and Conclusions .... 34—38

SECTION V. THE CONTROL OF THE MILK SUPPLY WITH SOME SUGGESTIONS.

Previous Legislation; Private Enterprise; Education; Prospective Legislation .... 38—42

APPENDIX A.—Tabulated description of Cowsheds (Specimen Sheet) ... 43

,, B.—Sketch of Types of Cowsheds in the Borough 44

,, C.—Sketch of Model Cowshed and Dairy Premises 45

,, D.—Summary of Milk and Dairies Bill, and Tuberculosis Order, 1909 .... 46—47

Section I.

No. of Farms, Cowsheds, and Cows.

This report deals exclusively with the production of milk at farms situated actually within the Borough. The total number of such farms is 75; the total number of cowsheds 141; and the total number of milch cows contained in these at the time of inspection was 1,207.

Dairies outside the Borough.

There are at present 129 dairy farmers on the Register whose farms are situated outside the Borough, but who bring their milk into the town for sale; and we have reason to believe that there are at least 50 other dairy farmers, outside the Borough, who bring their milk into the town for sale, but who have not registered with the Local Authority of Rochdale in whose district they carry on the trade of milk purveyors.

Method of Inspecting and Reporting.

Two Sanitary Inspectors visited each farm and a thorough inspection was made. Their report took the form of detailed answers to a series of questions set out on sheets with which they were supplied; and measurements were made in each case regarding cubic space, lighting, and ventilating areas. These answers have been condensed, summarised, and transferred under appropriate headings to form App. A of this report. In doing so great care has been taken to ensure that all the salient features of each cowshed, dairy, and milk store have been fully and accurately represented.

COWSHEDS.

Average Occupation, etc.

Of the 141 cowsheds mentioned, 4 are either unoccupied or occupied by young stock, leaving a total of 137 cowsheds at present occupied by milch cows. This is equal to an average of 8.81 cows to each cowshed; 16.09 cows to each farm; and 1.8 cowsheds to each farm.

Division into Groups.

As regards structural conditions and arrangements, it has been found possible to divide the 137 occupied cowsheds into three fairly distinct groups, namely: I, good; II, fair; III, bad. The following short table gives the respective number, the number of cows affected, and the average occupation, in each group:—

OCCUPIED COWSHEDS.

	No. of Cowsheds.	No. of Cows Affected.	Average No. of Cows to each Cowshed.
Group I—Good	30	400	13.33
,, II—Fair	39	419	10.74
,, III—Bad	68	388	5.70
Totals... ...	137	1207	8.81

From this table it will be seen that though one half the total number of cowsheds are classified as "bad," yet the number of cows housed under the worst conditions is less than one-third of the total number.

GROUP I.

The 30 cowsheds of this group are of various types, many of them being of modern construction; some of them being old buildings reconstructed, or renovated, or altered to comply in some degree with modern requirements; and nearly all of them being sufficiently spacious to allow of from 700 to 800 cubic feet of air space for each stall.

Division A.

In the best of them the lighting area equals or exceeds an average of 3 square feet per stall or cow; the windows are so well arranged and distributed that every part and corner of the cowshed is clearly visible; the ventilation is carried out by proper tube inlets and openable windows, and by extraction shafts carried to the ridges of pitched and sloping roofs; the ceilings are formed of well-wrought boards; the floors are of good flags, concrete or blocks, so laid that the cows seldom lie in their excreta, and are well sloped and channelled to properly trapped drain inlets situated outside the cowsheds; the stalls are so arranged that the cows breathe into ventilated passages, and not directly on to the walls; the space at the rear of the stalls is sufficiently wide to prevent any splashing of the walls with cow dung, and where there are two rows of stalls the space between the rear of the animals forms a wide raised gangway along which air may easily circulate; the finished surface of the walls is fairly smooth; there is a good and sufficient water supply in the cowshed itself; and the dung pit is sufficiently removed to prevent entrance of effluvia from it to the cowshed, at any time. See App. B., Sketch I. This cowshed, however, is adjoining the barn.

Division B.

In others of this group some of the best features are absent. Some of the cowsheds, though otherwise well constructed and arranged, have roofs which form the continuation of the sloping roofs of barns. and the outlet ventilating shafts are not carried up to or on a level with the ridge of the higher roofs, as in App. B., Sketch I., but cut short at 2 or 3 feet above the slope of the cowshed roofs; thus rendering the outlet ventilators only operative at certain intervals. In one new and otherwise very good cowshed the top of a wall left open to the rafters of a barn is the only means of outlet ventilation.

Division C.

The worst type in this group are those cowsheds in which the ceilings are rather low, flat, and form the floors of hay lofts above. In one instance at least where other conditions and arrangements are satisfactory, no arrangement had been made for the escape of warm impure air at the ceiling, and the atmosphere was found to be offensive. Many of the ceilings of this type, however, have been cut away immediately over the heads of the cattle for the whole length of the cowsheds and for a width of from 4 to 6 feet; and the hay lofts above have been boarded off with tongued and grooved boards, thus forming chambers into which the respired air from the cows might rise and escape through extraction shafts carried to the ridges of the hay loft roofs, and at the same time protecting the hay from pollution. See App. B., Sketch 5.

Many of the cowsheds in the last two divisions of Group I have the lighting badly arranged, and whilst one portion is sufficiently lighted, another portion may be in comparative darkness.

GROUP II.

In this group have been placed such cowsheds as do not comply with modern requirements, but which are capable of being improved, without great difficulty, to such an extent as to render them at least equally as good as the worst type in Group I.

Division A.

Most of them are constructed with hay lofts above, and have openings of some kind or other as ventilators into the hay loft itself. Many of them are arranged with the stalls in two rows, the cows facing each other across gangways varying in width from 6 to 11 feet. This arrangement is a bad one, the cows breathe into one another's faces, and should it happen that there is one tubercular cow it provides a ready means for the dissemination of this disease through the whole herd by means of discharges from the nose and mouth and on coughing. These gangways in some cases are open for their full height up into the hay lofts; and in others are covered at the level of the cowshed ceiling with open-jointed loose boards bearing the hay above. See App. B., Sketch 4. In both cases considerable pollution of the hay takes place as the result of the upward movement of the respired and vitiated air from the cows, and by the settlement of dust from the bedding and cowshed.

Others in this group are separate buildings not in very good structural condition as regards walls, floors, ceilings, and drainage; not sufficiently lighted and ventilated; but where the hay is not stored above the cows, as in App. B., Sketch No. 3. An instance of this kind is a cowshed with pitched roof, not underdrawn, and with no means of outlet ventilation except through the joints of the slates; with feeding passage of good width at front of cows, but insufficient space at rear of cows; with good flag floor properly sloped and channelled, but with the windows badly arranged and the light badly distributed. Division B.

GROUP III. This group embraces all those 68 cowsheds which are badly constructed, badly arranged and badly drained; many of which are in their present condition unfit for housing cows and incapable of improvement, unless at great expense and with difficulty.

In most of this class the lighting is very bad, and in many cases there is really no light at all except when the cowshed door stands open. The ventilating arrangements are often very primitive and insufficient, and in more than one case there are no arrangements whatever either for the outlet of foul air or the inlet of fresh air. The floors are badly constructed, the walls are of rough material, the ceilings formed of open jointed boards in a dilapidated condition and forming the floor of the hay loft above. In the most common type the front of the stalls is open to a large barn containing a large volume of cold air which so far from assisting in the proper ventilation of the cowsheds, has a tendency to cool the smaller volume of warm impure air in the cowshed and to cause a back-draught on to the heads of the cattle. See App. B., Sketches 2, 3, 6, and 7.

A brief description of three distinct types in this group of "bad" cowsheds will give a good idea of the conditions as a whole.

No I. Type.—Cows facing wall having openings to barn; openings above heads of cows made up with boards and rough sacking. No means of ventilation except small hit-and-miss ventilator in door. No light except that borrowed from barn door which is fitted with small sealed window. Space at rear of cows 3ft. 6in. wide. Walls of rough stone on which dust from bedding has lodged. Lower parts of walls along rear and sides caked with dung which has splashed on to them and dried. Floor constructed of flags which are broken and uneven and into the large open joints of which the liquid excrement has percolated. The channel badly laid and badly sloped; no drain whatever; the absorbent nature of the shoddy relied on for the removal of liquid. The floor of the stalls not paved, but covered with a layer of clay into which some of the shoddy has been pressed. No water supply within a reasonable distance of cowshed. Dung pit within 3 yards of cowshed door and not drained. Cowshed much overcrowded. Ceiling dilapidated and very low.

No. II. Type.—Cows facing wall without any openings. No means of ventilation; all crevices stuffed up with hay or straw; opening under door blocked outside with cow dung. No light except small pane of obscured glass fixed in door. Walls of rough stone and in a dilapidated condition, holding dust and splashings of cow dung. Space at rear of cows about 4 feet. Floor constructed of soft absorbent bricks; part of floor formed as channel to an untrapped drain inlet inside cowshed. Ceiling dilapidated and very low. Cowshed much overcrowded. Bed of stalls formed of boards laid on clay. No water supply within reasonable distance. Dung pit adjoining and communicating with cowshed.

No. III. Type.—Constructed entirely of wood not wrought or smoothed. Cows facing and breathing directly on to the rough wood walls. No means of ventilation. Lighted by one small window. Floor of soft bricks; no proper channel; drains out on to field. Surface of walls and roof very dusty. Overcrowded. No water supply near. Dung pit almost adjoining.

External Conditions.

The external conditions and arrangements are generally unsatisfactory. Particulars of construction of yard surfaces and of the drainage and its outlets, also the situation and construction of the dung pits, will be found in the detailed summary.

Yard Paving.

Many of the yards are unpaved and undrained; and many are paved with defective and unevenly laid cobble stones. Such conditions as these render thorough cleansing and freeing from refuse almost an impossibility. In a few cases, however, the yard surfaces are paved with grit setts, well laid and sloped to sufficient and suitable drain inlets, and are kept clean.

Dung Pits

With very few exceptions no proper arrangements have been made at the farms within this Borough for the reception of the dung and sweepings from the cowsheds. In only some of the most recently constructed are the floors and walls constructed of impervious material. Every dung pit should be entirely disconnected and at a suitable distance from the cowshed and milk store. It should have the floor and walls of impervious material, and it should be connected to a drain or cesspool by gully trap placed outside the pit, and towards which the floor should slope. (See App. C.). One generally finds that the dung is thrown out into a corner of the yard or curtilage without much regard to the distance from the cowshed or living premises; and the liquid manure instead of being properly drained away, lodges on the uneven surface of the yard, or percolates into the soil or open joints of the pavement.

Cubic Space and Overcrowding.

Of the 137 occupied cowsheds, 72 were found to be overcrowded. In adjudging whether a cowshed is overcrowded or not, the cubic space available for each cow has not been the only consideration. The minimum cubic space considered to be allowable, varies with different authorities from 600 to 800 feet per cow, and during this inspection all cowsheds having less than 600 cubic feet of air space per cow have been classed as overcrowded, while at the same time those cowsheds having more than 600 and less than 800 cubic feet per cow, but not having sufficient means of ventilation, have also been classed as overcrowded. Where, however, the means of ventilation have been good, and in reasonable use, a minimum of 600 cubic feet has been considered satisfactory. Cubic space, however, is not the only, and probably not the most important consideration; without an efficient system of ventilation and good lighting, and plenty of floor space to secure cleanliness, cubic space has a limited value. Speaking generally, the means provided for the ventilation and lighting of the cowsheds is neither good nor sufficient, except in the more recently constructed or reconstructed premises; and, the peculiar construction of a large number of the premises renders their improvement in this respect a matter of difficulty and expense. In some cowsheds no recognised means of ventilation whatever have been provided; and in others such means have been provided, but without any regard to suitability of position, or to any consideration of the relative capacities of inlet and outlet areas. A hole in the wall, or an unglazed window pane, has been pointed out to the inspectors as "the ventilator." Casual openings let into the wall are not satisfactory on account of their irregularity of size and action, and the ease with which they can be plugged up. It is very disappointing when even the means which have been provided for ventilation in the cowsheds in

Ventilation and Lighting

this Borough, are not reasonably used; in fact it was the rule to find all the available means, and every opening or crevice likely to assist to any extent in the renewal of the air, absolutely blocked up; windows made to open were swollen fast in their frames, wall inlets were stuffed with hay, straw or sacking, and even the openings in badly fitting doors were stuffed up. The traditional conservatism of farmers as regards ventilation and lighting is very interesting. Many farmers still believe in the virtue of darkness, in which condition the cows are supposed to feed better and produce more milk. Such fallacious notions can only be dispelled by wider study, and by contrast with the experimental results obtained from cows kept in well ventilated and well-lighted cowsheds. A cowshed cannot be considered efficiently lighted, unless the light can penetrate to every part, and this can only be attained bv the proper disposition of windows in the side walls or roofs or both, and each cow should be allowed 3 square feet of window space. The farmer has yet to learn that light is one of our best disinfectants and a preventive of many diseases, especially tuberculosis, and further, that darkness, dirt, and disease invariably lurk together. To secure efficient ventilation, where a sufficient supply of fresh air is constantly supplied without causing a draught, many devices in recent years have been suggested, and are too numerous to discuss in this Report. But it may be safely said that the simplest methods are invariably the best, and further that no system, however simple or elaborate, can be of any good unless used. The side and end windows should open inwards at the top on bottom hinges, so as to be utilised for inlet ventilators, and in this way to disperse the air entering as much as possible. The extraction of the impure air is usually best obtained by the proper arrangement of shafts and extracting cowls, fixed in the centre of the roof when the walls are unobstructed, but when one wall is obstructed, as near this wall as possible.

Use made of Ventilators.

Cleansing of Cowsheds.

Great improvement is necessary before anything like a reasonable standard of cleanliness in the cowsheds can be assured. With the exception of the removal of the dung from the channels, twice each day, and the bi-annual lime-washing of the walls, and in some instances the ceilings also, no proper regard is paid, in the majority of cases, to the efficient cleansing of the cowshed itself. The consequence is that many of the walls, partitions, and fittings bear accumulations of filth, principally dung splashings and dust, which proves more and more difficult to remove the longer it is allowed to remain. The floors, too, particularly the portions used as gangways at the rear of the channels, are not kept sufficiently clean; in many cases they exhibit no signs of having been thoroughly cleansed or swilled with water for a considerable period.

Bedding

Various materials are used for bedding the cows, among them being straw, moss litter, saw-dust, refuse from the hay chopping machine, and straw previously used in the stable (a very objectionable and dangerous material). But by far the larger number of the cows are bedded on shoddy—a kind of waste material obtained from the cotton-waste manufactories in this town. Whilst recognising the cheapness of shoddy, the convenience of obtaining it, and its usefulness in the absorption of liquid manure in the cowsheds, it is at the same time a very light and fluffy material; and when spread beneath the cow in a thin layer as is usually done, it is very readily displaced by the cow and by every movement in the cowshed, and is thus liable to cause a considerable amount of dust, which is very undesirable in a cowshed. To obviate this there are many devices which could readily be adopted; such as mixing it with sawdust or moss litter; or damping it slightly with a watering can; or a thick layer of shoddy might be put down and a layer of sawdust or moss litter or straw, etc., on the top of it. This would require more shoddy, but at the same time it would provide a better bed for the cows.

Feeding Tubs.

In only one cowshed within the Borough were trough mangers fixed in the stalls themselves, and these were not in use. The custom is to feed the animals from loose tubs, sometimes of oak, sometimes of galvanized iron, and in a few instances of soft wood, such as is used in the making of margarine tubs. Provided a loose feeding tub is constructed of impervious, smooth material, and so as to be easily cleansed, and providing great care is exercised in its cleansing and storing, little objection can be made; but when no systematic cleansing of the wood tubs is carried out as is the case in some of our cowsheds, the danger of spreading infection from a diseased cow owing to interchange of the tubs cannot be anything but great. In this way one tubercular cow in a cowshed may infect the whole herd by the interchange of feeding tubs.

CLEANLINESS OF COWS AND MILKING.

Cleanliness of Cows.

In some cases the cows were found to be clean both as regards the hides, the udders, and the teats, and it is desired to give all due credit to those farmers who have adopted a daily grooming of the cows, and a systematic cleansing of the udders and teats, with clean cloths before each milking. It is, however, regrettable that in the great majority of instances, the cows were only fairly clean, and showed no signs of such careful and systematic attention. In the worst cases found, a reprehensible neglect in this respect was apparent—the hides were covered with dust, the udders were dirty, and the hind quarters often caked with dung only removable by tearing off the hair of the hide itself.

Cleansing of Udder before Milking.

On enquiry during the inspection the following replies were elicited—see App. A.:—

I—Rubbing the udder with hands of milker	30
II—Rubbing the udder with a dry cloth	25
III—Brushing the udder	11
IV—Washing with warm water	1
No attempt at cleansing stated	8

All these alleged methods of cleansing the udder, unless carried out intelligently, with a clear understanding and earnest desire to attain the end in view, may be, and often are, an additional source of milk pollution. During the inspection, and at other visits, when one of those who adopt Method I. was asked to show how he carried out his method, the milker sat down and usually placed the pail beneath the udder, which he rubbed with both hands and then proceeded to milk. It never seemed to occur to him that in this way the milk pail had received a considerable amount of dust and detachable manure, which it might have escaped if there had been no rubbing. Further, by such procedure it is of little importance whether the hands are previously washed or not. Likewise, the wiping of several udders with the same cloth—Method II—and the cloth itself unless frequently and thoroughly cleaned, both present many risks. Method III has much to recommend it, when the cows are groomed and the udders cleaned and brushed regularly and at the proper time. The washing of the udder—Method IV—is not practised in this district. The farmers think that it would cause Mastitis and decrease the milk secretion. In this there is some truth when cows are kept under abnormal conditions and the process not properly carried out. But that it neither causes the one nor the other is proved by the experimental evidence of many dairy companies and dairymen. Any method may be considered so far satisfactory just in proportion as it is intelligently carried out to attain the end in view; but when one finds that both the method and the practice combine to defeat the object in view, we must conclude that this very important matter does not receive any very serious nor intelligent consideration.

The Milker and Cleansing of Hands.

It is very difficult to estimate to what extent the thorough washing of the hands before milking is observed; but it is to be hoped that the great majority carry it out more or less, however imperfectly. Although the answer given to this question is always in the affirmative, the Dairies' Inspector informs me that occasionally he meets with cases, when the hands of the milkers are so filthy, that he stops the milking until the hands have been thoroughly scrubbed and washed. Hence, one must be to a certain extent guided by some circumstantial evidence and by the observations made by the inspectors at times of milking; and, it is very significant and disappointing to find, that no appliances for washing and cleansing the hands are actually within, or sufficiently near, any of the cowsheds. It is thus at least evident that the practice of washing the hands after milking each cow, as carried out by the cleanest of milkers in many districts, is not attempted here. One regrets to still find that not infrequently the milker comes from the field or farm yard and sits down to milk with hands soiled and unwashed; or, if washed, done imperfectly. In no case is an over-all or white clean blouse used, although these would prevent a great deal of contamination of the milk from often dust-laden and infectious garments. Gross cases are still reported from some districts, where the milker is seen to blow his nose with his fingers and wipe them on his dirty sleeve or trousers, or spit on his hands and rub them before going on milking. But it is to be hoped such instances are becoming rare. In this respect one regrets the passing of the milk-maid. Her tidy clean appearance with sleeves folded up and hands and arms clean were always at least some guarantee of cleanliness.

Wet Milking.

Wet milking is a very reprehensible and filthy process and should never be allowed. No dirt is so difficult to remove from milk as that which enters in a liquid or semi-liquid form. It is often disgusting to look at, when teats are covered with excreta and the hands not too clean; they often look as if dipped in treacle. Further, this process is liable to be a fertile source of contamination of the milk by the transference of any infectious matter, not only from the teats, but especially from the hands of the milker. Each time a film of milk is left on the teats in which germs thrive and multiply, and at next milking these are removed and washed into the milk. During the winter months this process is often detected by the ulcerated and excoriated condition of the teats.

Milking Machines.

In recent years these have been introduced. But, while they save labour and do the milking more completely, and in theory should attain that desirable ideal of clean milking, as yet they possess several drawbacks and are not in general use. The apparatus is complicated, difficult to clean, and expensive.

WATER SUPPLIES AND DRAINAGE.

Water Supplies.

Of the 75 farms reported on, 38, or about one half the number, are provided with Town's water, supplied from the mains either of the Rochdale Corporation or of the Heywood and Middleton Water Board. The supplies to the remaining farms consist chiefly of spring water collected in wells, and either laid on in pipes to various parts of the premises and gravitating thereto, or pumped into some receptacle from which it is drawn when required. Some of the supplies are from surface or shallow wells, and some others are simply from running streams liable to pollution at any time. In the majority of cases the supply is abundant, though very seldom laid on so as to be as convenient as it ought to be. The experience of the past has frequently demonstrated the dangers of disease and epidemics from a water supply which is not above suspicion of contamination. When any other than Town's water is used it ought to be examined before use. The water supply should be abundant and laid on under pressure to the different buildings—to the boiler house, milk vessel scalding house, feeding house, cowshed, etc. In the cowshed the water should be carried from the main or from a cistern in front of the stalls, with branch pipes passing off to each cow's trough, so that a continuous supply is maintained and the cow does not depend on fortuitous circumstances for a drink of water. A hose attachment is also necessary within the cowshed for flushing purposes. In very few of the cowsheds within the Borough is there a sufficient supply within the cowshed for cleansing purposes, and in the great majority of cases there is no supply within the cowshed at all.

Drainage

In only 4 or 5 cases are the drainage systems on the farms connected with the public sewers, and these systems properly trapped, ventilated and intercepted. In the majority of cases the farms are not so situated as to render the sewer available, and consequently other means of disposal have been resorted to. Cesspools and cesstanks of varying, and often excessive capacity, but in no case with impermeable floor and walls, form the completion of most of the drainage systems. In many instances these tanks are provided with overflow arrangements, which discharge the surplus sewage on to the surface of the land. But as there appears to be no systematic and periodical emptying and cleansing of these receptacles, and the sewage is allowed to overflow for long periods, it is difficult to see any great advantage in this arrangement over the primitive and objectionable method, obtaining at about a dozen of the farms, of turning the sewage directly on to the land or into streams. The disadvantages of, and even danger from, this last-mentioned practice, especially at such places as depend upon shallow wells and surface water for their water supply, is very obvious. The liquid manure, which may be both bovine and human, percolating through the soil, often readily finds access to surface water supplies and wells, and may contaminate the water, which in turn in being used for dairy purposes may readily contaminate the milk In this way a vicious circle of infection may become established. Many sporadic outbreaks and severe epidemics have now been traced to this cause, and Rochdale provides an example—in September, 1880, Dr. J. Henry, Medical Officer of Health, described an outbreak of typhoid fever due to the pollution of the milk by water from a defective well. The excreta from a case of typhoid in the dairy farm house was thrown into a leaky cesspool and from this cesspool the dip of the soil inclined towards the farm well. An epidemic of typhoid broke out a fortnight after this typhoid case, and the incidence of the disease fell on those using the milk from this farm. There were 35 cases, and 26 of these were drinkers of the suspected milk, or 74 per cent. of the total cases, and there were 9 deaths. There was also evidence to show that besides being used for dairy purposes, the water from this well was probably used to adulterate the milk.

Drain inlets were found inside, in at least 25 per cent. of the cowsheds; the majority of these inlets are trapped, but in several instances they form simply an upper portion of an old brick or stone drain, with no means whatever for the prevention of the entrance into the cowshed of effluvia from these drains.

Of the remaining 75 per cent. of the cowsheds, several have no drain inlets at all, the absorbent nature of the shoddy bedding being relied upon for the removal of liquid manure. Most of them, however, are provided with trapped inlets outside the cowshed, and the floors of the cowsheds are sloped to the inlets. In some cases, where alterations have recently been carried out, or the drains have been reconstructed, all the drainage arrangements are on modern and sanitary principles.

DAIRIES AND MILK STORES; THE CHILLING AND STRAINING OF THE MILK; AND THE CLEANSING OF VESSELS.

To fully understand the great lack of suitable accommodation which prevails in respect of dairy houses and milk stores at the farms in this Borough, it must be borne in mind that the farmers here are not to any extent really dairy farmers, but are what are known as "milk-kitters," that is, persons who immediately transfer the milk produced to the kits or metal vessels from which the milk is supplied to customers in the town. In many cases, indeed, the milk never enters the dairy at all, but is strained or sieved inside or close to the cowshed, from where the cans are loaded into the milk float ready for delivery. In such cases the only milk stored is that which is left over after the round is finished, and which may, or may not, be mixed with the next consignment of milk to the town.

Construction and suitability of Dairies and Milk Stores.

There are no proper and suitably placed dairies or milk stores. Almost without exception the places used as such are part of the dwelling-house and communicate with the living rooms occupied by the farmer and his family.

Milk Storage.

The place used as a milk store is generally a dark and badly ventilated cellar under the kitchen, not often in good repair, and not infrequently containing an inlet (either trapped or untrapped) to a drain. The vessels used for the storing of the milk are generally wide open-topped glazed earthenware mugs, and very little attempt is made to prevent the possible entrance of dust to the milk during storage.

Vessel Washing Accommodation and Appliances.

The rooms in which the vessels are washed and stored until required, are, on the whole, very badly situated, ill-adapted, and not at all commodious. In about 90 per cent. the vessel washing is carried on in rooms attached to the house and used both as sculleries and pantries, and for the washing of the family linen. In a few instances the kitchen or living room itself is the only available room for living, washing, sieving of milk, and cleansing of vessels. Such conditions as here described should not be permitted. They are a direct contravention of all sanitary principles and Bye-Laws which govern such matters. If there is any possibility of contamination or infection of the milk, such conditions provide every facility for such to take place. No dairy farm is now considered properly equipped, nor the business properly conducted, unless the milk store and the house in which the milk vessels are cleansed and scalded or steamed are both entirely disconnected from the cowshed; and have no communication with living rooms, by doors, stairs, passages or windows. The privy, midden, drain or water-closet should not ventilate into either milk store or scalding house, and from which they should be sufficiently removed. (See App. C.).

Hot Water Supply.

As regards the supply of hot water for purposes of cleansing and sterilising the vessels, it can only be said that it is neither adequate nor convenient; a side boiler of small capacity forming a portion of the kitchen fire-range, or a kettle placed on a kitchen fire, cannot be expected to supply sufficient boiling water to ensure the cleansing of the large number of vessels used on an average farm. The usual procedure is to pour into a large milk kit or can a small quantity of boiling water, which is suddenly cooled and which becomes tepid before it reaches the bottom. Consequently, the vessels can never be either scalded efficiently or in such a manner as to destroy Bacteria. Further, such inadequate arrangements and irregular methods nearly always lead to great carelessness, and one has no hesitation in saying that all milk vessels treated in this way are swarming with Bacteria and are a great source of milk pollution. In a recent investigation Dr. Orr took four cans which had been "scalded" as it is carried out by Yorkshire farmers, and were just ready to receive fresh milk. He poured about 6 tablespoonfuls of pure sterile water into each, and after rinsing removed from each can 1 c.c. (= 15 drops), and estimated the number of Bacteria. These numbered 48,000; 2,325,000; 19,960,000; and 605,000 per c.c. (or in each 15 drops). In the first case with a low count, the farmer filled his cans with actually boiling water containing soda, and allowed them to steep for half an hour. Vessel scalding even when done properly is not sufficient, but as ordinarily conducted is useless. Every dairy farm ought to have a high-pressure steam boiler, and all milk vessels sterilised by steam. By this means only can milk vessels be rendered Bacteria-free. All apparatus in the milk vessel cleansing house—boiler, steam chests, sinks, slopstones, etc., should be entirely reserved for this and no other purpose. No family linen, utensils, nor eatables, nor any articles connected with the household should enter this room. (See App. C.).

Construction of Vessels.

Many of the large kits are of good construction, being provided with double-lid arrangements—an effectual method of preventing contamination of the milk by dust during transit; and also with grooved concave bottoms allowing of proper draining or dripping. Detachable and accessible taps are used for the drawing off of the milk; the old objectionable method of lading out with a measuring can being done away with. Unfortunately some of these kit cans contain badly fixed brass measuring or gauge strips, behind which grease and sediment lodge and are difficult to remove. When such strips must be fitted inside these vessels, the openings should be carefully soldered. In the

" head-can " used for the collection of milk in the cowshed is a fixed metal sieve which is very objectionable. It cannot be properly cleaned unless the vessel is steamed; and the extent of pollution which it carries is best realised when it is removed for renewal. These sieves should not be fixed to the cans. The milking pails used are of tinned iron, galvanised iron, or enamelled iron, generally specially made for the purpose, but sometimes being ordinary buckets used exclusively for the purpose. The chief aim should be to provide vessels as free as possible from nicks and crevices, and with all parts readily accessible and easily cleansable.

Chilling of Milk.

In only four farms were any special means of cooling the milk adopted, and in two of these the apparatus was not in use. In no case, however, was the apparatus fixed in a suitable place; in one instance it was attached to the wall of the cowshed, only a few yards from a cow's tail. Although the cooling of the milk to 40-50°F. immediately after milking to inhibit the growth of Bacteria is of the highest importance; yet, if not properly understood and properly carried out, it may also become a great source of further contamination. During the process a large milk surface is exposed when passing over the cooler, and when the cooler is not in use its surface is also exposed and liable to contamination, which later is washed into the milk when next the milk passes over its surface. The extent of contamination will depend on the Bacterial content of the air which is greatest in the cowshed. Therefore, no cooler should be in a cowshed, but adjacent in a clean room, and when not in use should be carefully covered.

Chilling by placing the cans in running water or even iced water are not satisfactory—on account of the bulk of milk the cooling is not equable and it takes longer time. One of the best forms of cooler on the market is the "Lawrence." It is simple, cheap, and efficient.

Straining or Filtering the Milk.

This process becomes necessary through want of cleanliness. The method of passing the milk through one or more metal gauze sieves is the one most prevalent, though in many cases muslin cloths are used in addition. Many of these metal sieves or strainers are so constructed as to be difficult to get thoroughly clean with ordinary methods of washing, and some of them were even found to be out of repair and altogether useless for straining purposes. There is little excuse for the use of uncleansable strainers. There is now on the market a vessel stamped out of a single sheet of metal and with detachable and easily cleansable sieves, and which is sufficiently cheap to be within the reach of the farmer. One of the best forms of filter, the " Ulax," in which cotton wool is utilised as the chief filtering medium, is not in use in this district; although it has been proved to be at least 6 times more efficient than muslin and and wire gauze.

Many dairymen appear to cherish the notion that, no matter what takes place before, after straining we have a pure milk; and fail to appreciate the truth that some part of everything which enters the milk, especially Bacteria, will pass through the strainer—the grosser parts are only kept back. Such convenient and pleasing deception can only be dispelled by education and a deeper sense of responsibility.

Appendix C

In App. C to this Report is given the plan and cross section of a model cowshed and dairy premises. . A detailed description is omitted, as the general plan that should be followed as well as the disposition of all the parts is sufficiently evident. Such an arrangement provides the best conditions:—(1) for the effective lighting, ventilation, cleansing, drainage, and water supplies; (2) for securing the cleanliness of milk vessels and milk stores; (3) for straining and chilling the milk; (4) for preventing infection and any contamination of the milk. Under such a scheme most of the disadvantages and serious defects in dairy-working as it is generally carried on in this district, and which has been so frequently adverted to and described in the preceding pages, would disappear. Not only could the business be carried on with much less labour, but with greater pleasure and greater profit. We have here such conditions as admit, and are conducive to the production, of a reasonably pure milk, and without which even the efforts of the cleanly disposed will be largely frustrated.

Regarding some of the dimensions given in the cross section there is some slight difference of opinion, especially as regards the manure channel and length of cowstall. The aim is to have the stall of just such length that the cows' hind feet stand on the edge of the channel. The stall is often too long and then the excrement instead of being discharged into the channel, falls on the stall, dirtying the cows' hindquarters and udder when she lies down. The manure channel should be about 2ft. 6in. in width and 6in. in depth. It is frequently found of such construction that the liquid manure becomes dammed back by solid excrement. The tail becomes besmeared, and then in turn the cow's body as well as the bodies of her neighbours and those who feed and milk. Experience shows that a good working arrangement in cross section, for feeding passage, feeding trough and stall, channel and gangway, is 4 feet, 1½ feet and 6 feet, 2 feet and 5 feet respectively. There should also be rails in front to prevent the cows reaching over into the feeding passage. With such general arrangements very little is required to keep the cows clean. They always lie well on the bed, and soon begin to appreciate that it is more comfortable to lie clean than in such a way as to have their hindquarters lying in dung. The channel should slope transversly away from the cows as well as in length, and the liquid therein be conveyed through the external wall and discharged over a gully trap, which in turn is connected with a drain or to a tank situated in a field sufficiently far removed from the dairy. The tank should be watertight, provided with a sludge pump and emptied regularly on to the land. The floor should always be formed of cement concrete, smooth, but grooved so as to afford a foothold for the animals. Also the walls should be rendered smooth by cement to their full height or at least to a height of 6 feet by cement or glazed bricks. If they are rough then they become splashed and caked with excreta and cannot be kept clean. The stalls in this plan are represented as single. We are now aware that Tuberculosis spreads rapidly among dairy herds by contagion; and therefore in every new cowshed a separate stall and glazed earthenware feeding trough should be provided for each cow, in order to prevent as far as possible the propogation of Tuberculosis. Then in every cowshed there ought to be sufficient and convenient arrangements for the washing of the hands, and an adjacent room for straining and cooling the milk. Some other features which should obtain and which have been adverted to are represented in the model plan.

Section II.

MILK IN RELATION TO HEALTH AND DISEASE — ESPECIALLY MILK-BORNE DISEASES.

Discussion on the Importance of a Pure Milk Supply

It would be superfluous at this time of day to emphasize the importance to any community of a pure milk supply. So universally is this recognised that no department in public health work, has, in recent years, received more consideration. The medical man, the chemist, and especially the bacteriologist has shown that milk is a foodstuff potential for great good or for great evil.

Infant Feeding with Impure Milk.

While milk forms a large part of the diet of every member of the community, and often in the case of infants and invalids the only food, there is no one who does not benefit from a pure milk supply. On the other hand, with an impure milk supply there is no one who does not suffer; and no section of our population is affected more deeply and responds more readily to either the one condition or the other than our infantile population. More than half the infants born in Rochdale at the present time are bottle fed; and our experience here is just as elsewhere, that from various causes the number is yearly increasing. These infants depend entirely on cow's milk from the very first, and during the most active period of growth, to lay the physical foundations on which the superstructures of the future men and women are to be raised. Hence, it may be said, that this important question of the milk supply combined with infant feeding and nursing, lies at the heart and core of the cause of our so-called physical degeneration and the decadence of the English race, about which there is so much at the present moment written and spoken. For, if the foundation is not well laid in infancy, it can never be in later life; and the finished structure of the man or woman if not stunted and dwarfed for life, never reaches its full development.

Then when we compare the mortality among the bottle fed with breast fed infants, we find that on an average for every death amongst the latter there are three to five deaths amongst the former. To explain this difference we have to consider the bacteriology of our milk supplies. The breast fed infant receives its milk, as Nature intended it to be, pure and germ-free. Whereas its less fortunate brother, the bottle fed infant, receives its milk impure, germ-laden and often poisonous. This is a serious reflection, but its truth is only too evident when one contemplates the general conditions under which the milk is produced and manipulated. With the majority of farmers and dairymen cleanliness in the scientific sense, and such as is required to produce reasonably pure milk, is not understood. With many it is not even considered. With some it is ignored. One has only to picture what is happening during the process of milking in a badly arranged, badly constructed, ill-ventilated, ill-lighted, filthy cowshed, with the air foul and oppressive, and the dung pit adjacent or a few feet from the door. Where the cows are seldom or never groomed, and their bodies, especially the hind quarters and udders, covered with dust and their own excreta. Where appliances for the washing of hands are not to be seen, and the milkers returning from all kinds of work may, with no over-all or clean blouse, and with hands washed or unwashed, sit down to milk into vessels, which for the want of steaming or adequate scalding, are teeming with bacteria. Everywhere throughout the whole process, from the cowshed, from the cow, from the milker, and from the utensils, the milk receives repeated additions of visible grosser filth and the more dangerous invisible pathogenic microbes, which lurk everywhere where filth abounds. The microbes once in the milk nothing at the farm can separate. The finest filter or strainer only removes the grosser filth, but not the microbes. A regiment of these could pass through the smallest pores of the finest milk strainer. The microbes now thrive and multiply rapidly in the milk, and the products of their activity bring about those changes which are spoken of as "milk going wrong," "becoming sour and curdling," etc., while there are other changes far more delicate and subtle, concerned in the production of colours, flavours, and toxins.

Health Visitors in Relation to Infant Feeding and Impure Milk.

Health authorities in nearly all towns and counties are now appointing lady health visitors, and in many places their work is supplemented by a staff of voluntary lady workers. The duties of these are chiefly to advise mothers regarding the nursing and feeding of their children, but it is very evident that much of their work is frustrated and can never reach its full fruition while the milk about which they advise is not above suspicion. Many health authorities, recognising this anomaly and the difficulty of obtaining a pure milk supply, have established municipal milk depôts for sterilising the milk, and as far as can be learned from available and comparable statistics, the results are very encouraging. Very few infants fed on depôt milk suffer from infantile diarrhœa. But experience has shown that many circumstances militate against the permanent success of such institutions. There is the initial expense and maintenance, and it is difficult in so many cases to get people to attend regularly once or twice a day for the milk. Further, such institutions are a recognition and palliation of culpable filth, and at best they can only be considered as temporary expedients, while the larger and more logical ideal of a pure milk supply is constantly held in view.

The teaching of bacteriology shows clearly that the great source of contamination is the cowshed, the cow, the milker, and the utensils, and the only reasonable and logical solution is to remove the evil at its source by the establishment of a higher standard of cleanliness.

MILK-BORNE DISEASES.

From the point of view of preventive medicine, and as more widely affecting all sections of the community, we have now to consider (1) the chief milk-borne zymotic diseases—zymotic enteritis, scarlet fever, typhoid fever, and diphtheria; (2) tuberculosis in relation to milk.

ZYMOTIC ENTERITIS.

Summer Diarrhœa and Infantile Mortality.

One of the most fatal of infantile diseases is "Summer diarrhœa"—epidemic or zymotic enteritis. It causes a mortality of about 25 per 1,000 births during the first year of life, and is notoriously greatest amongst the urban poor and bottle fed infants.

This is pre-eminently a filth disease associated with overcrowding, want of ventilation and light, want of cleanliness, foul air emanations from any filth, and all such conditions as contribute to the contamination or excremental pollution of food and milk. This may occur readily enough during the proces of milking and handling the milk, or it may occur readily enough when the milk is stored in small overcrowded ill-kept houses. It may also occur indirectly by the fouling of food and milk by the feet of flies and various other agencies. The conditions most favourable for this last mode of infection are in and around houses, where the yards and courts are unpaved or badly paved and drained, where the system of removal of sewage allows of the accumulations of filth; and especially if the soil is loose and porous or "made up" and consequently polluted with excrementitious and decaying organic matter. In such soil, sewage and intestinal bacteria abound, and as opportunists they wait until the soil, temperature, moisture, etc., are favourable for their multiplication and dissemination, as occurs during the hot and dry months of summer, when they get abroad, air-borne, and by various means, to poison food, especially milk.

Although in recent years a great deal of valuable work has been done on the bacteriology of epidemic diarrhœa, and although most observers are agreed that the disease is of bacterial origin, and several different micro-organisms have now been isolated from the excreta of patients during several epidemics of summer diarrhœa, it appears that we are not yet in a position to fix on any one of these as the only causal micro-organism. Klein has investigated the cause of many such epidemics and describes a bacillus—the bacillus enteritidis sporogenes—which he frequently isolated from the evacuations of patients in cases of infantile and summer diarrhœa; and some of these outbreaks were undoubtedly due to the ingestion of polluted milk, from which also the bacillus was isolated.

More recently during the past four years Morgan and others working in the Lister Institute have made an extended investigation of this disease, and have found in the stools and bowel one bacillus—Morgan's No. 1 Bacillus—to predominate in frequency over all other pathogenic micro-organisms associated with intestinal affections. It is also important to note that batches of house flies obtained from certain London districts were frequently found to contain Morgan's bacillus, and consequently flies at any moment may become active agents in polluting food and milk, and spreading this disease. This bacillus grows well in milk and readily produces diarrhœa and death in young animals; and is probably an important causative agent in the production and dissemination of summer diarrhœa.

There are many other organisms which have been associated with infective or summer diarrhœa and other forms of catarrhal diarrhœa, some of which are the bacillus enteritidis gäertner, the bacillus ærtrycke, the para-typhoid or para-colon group, the bacillus coli-communis, and the bacillus of dysentery; this latter bacillus appears an improbable cause and might be excluded, although in America it is proved beyond doubt that bacilli of the dysentery type are frequently a cause of summer diarrhœa in that country.

It appears that bacteriologically no sharp line of demarcation can as yet be drawn between the different forms of diarrhœa met with in infants and adults. The probability is that the condition may be produced in both by a variety of micro-organisms, and this may be the interpretation of what we find in practice, that the clinical features vary considerably in different epidemics. Many of these bacteria are readily found in all kinds of decaying and putrefying foodstuffs—meat and milk. Others again of which the bacillus coli-communis may be taken as a type, and some of its near allies, which are now known to be the cause of summer diarrhœa, have become normal inhabitants of the intestinal canal in man and the lower animals, and in a normal healthy bowel, they remain quiescent, or even assist in the processes of digestion. But in any abnormal or pathological condition of the bowel, as during typhoid fever, gastro-enteritis, and other forms of diarrhœa, these bacteria show great variability in degrees of virulence and pathogenicity. Consequently, when milk becomes infected from such a source there is proportionately greater risk to those who use it than if infection had occurred from normal excreta. One so frequently finds in investigating the cause of obscure and sporadic outbreaks of various forms of gastro-enteritis, that it was just preceded at the farm or milk-shop from which the milk was supplied by some one or more being ill in the same way, and that no precautions had been taken to prevent contamination of the milk. However, from the point of view of preventive medicine all these micro-organisms possess one feature in common—they are associated with filth and sewage, and the excreta of man and animals, and hence diarrhœal diseases are pre-eminently filth diseases, and the prevalence of these in any community is frequently taken as an index of the hygenic conditions of that community.

Summer Diarrhœa and Water Carriage System.

Newsholme, in a study of epidemic diarrhœa covering a period of 17 years, finds that towns which have adopted the water carriage system of disposal of sewage suffer much less from diarrhœa than those retaining other methods of removal of excrement; and that the average of the total infant deaths due to this disease during the hot months of the third quarter of the year in the largest towns of England was from 75 to 80 per cent.; and this high incidence and mortality falls chiefly on the bottle fed infants among the poorer classes in our towns. Many outbreaks of this disease in cities and hospitals are recorded every year and directly traced to polluted milk. In Brighton in 1901-02 there were 220 infantile deaths, and it was possible to trace 191 of these fatal cases to polluted milk. At the same time we justly recognise that the quality of the milk is not the only contributory factor to our high infantile mortality; often enough children suffer from insufficient quantity of milk; but, even in these cases, the greater is the need for what they do get being reasonably pure. Nevertheless, I believe that it is no exaggeration to state that, if we had a reasonably pure milk supply infantile summer diarrhœa would gradually almost disappear, and a great diminution in our infantile death-rate would ensue.

SCARLET FEVER, TYPHOID FEVER, AND DIPHTHERIA.

Historical.

One of the earliest observers to suspect milk as a medium for the conveyance and spread of zymotic disease was Dr. Michael Taylor, of Penrith, who in 1857, while investigating the cause of an outbreak of typhoid fever was able to establish a chain of evidence which proved conclusively that milk was the medium. To the same observer is also due the credit of investigating the cause of an outbreak of scarlet fever at Penrith in 1870, and first proving beyond doubt that milk was also a medium of transmission and spread of scarlet fever. Hence, was established for the first time the important knowledge that typhoid fever and scarlet fever were both milk-borne diseases.

To Dr. W. H. Power (Local Government Board), however, the credit is due of first showing that diphtheria also may be a milk-borne disease. He investigated an outbreak of this disease in North London in 1878. The investigation was a difficult but highly interesting one; and, reasoning by the process of exclusion, he found that the only possible conclusion was the one above stated—the truth of which since then has only been too clearly established. Since these discoveries were made a vast amount of bacteriological work has been accomplished, and our knowledge of the aetiology of zymotic disease correspondingly extended.

In 1881 the bacillus of typhoid fever was discovered, and three years later the bacillus of diphtheria. Each event which marks the discovery and isolation of the causal microbe of any disease must be considered as one of the highest importance to suffering humanity.

Witness the case mortality of diphtheria to-day and the diphtheria in pre-antitoxin days. In the latter it frequently averaged 30 to 40 per cent.; now, there would be very few fatal cases from diphtheria alone if anti-diphtheritic serum could always be administered early. Thus through the labours of scientific workers our knowledge and treatment of this and many other diseases has been raised from the level of superstition and ignorance, and placed on a rational and scientific basis.

Zymotic Epidemics.

In reviewing the epidemiological literature since typhoid fever, scarlet fever, and diphtheria were discovered to be milk-borne diseases in 1857, 1870, and 1878, respectively, there has been in the same order 200, 70, and 30 well-marked epidemics due to infection through milk, and for which England has already paid a heavy death toll.

Many of these earlier epidemics were described with a keenness of observation and accuracy of detail which does credit to their investigators; and, who not infrequently exhibited something of the scientific spirit which seeks for truth and hates obscurities. In the perusal of these reports one thing stands out prominently and impresses one deeply—that infection almost invariably followed the milkman's cart or the line of distribution from the milk shop; and, therefore, that the focus of infection is generally to be found about the dairy farm or milk shop. The harmless necessary cow is not to blame, for she is insusceptible to typhoid fever; and, although from time to time some weighty evidence has been adduced to prove that there are certain diseases of the udder of the cow akin to scarlatina and diphtheria in man, and transmissible through the milk, this matter must be considered sub judice, and bovine scarlatina and diphtheria not yet proved. The source of the infection is human. The milk is infected by infective persons handling the milk. In scarlet fever and diphtheria during the initial, acute, and possibly as yet undiagnosed stage, all discharges from the mouth, nose, and throat are very infectious, and in coughing, sneezing, speaking, and spitting, infective matter is disseminated into the atmosphere as a fine spray and will readily enough infect milk. Convalescents must also be a frequent source of infection; for we now know that the bacillus of diphtheria often remains in the throat 8 to 9 weeks; and that the infection of scarlet fever may remain for a long time about those who suffer from discharges from the nose and ears, and from swoollen glands; and about the articles of the home, especially the clothes, unless there has been thorough disinfection. Hence it often occurs that when some infectious disease is or has been in the house of the milker or dairyman, or anyone handling the milk, although they themselves may remain immune, yet at the same time they may act as carriers of the infection to the milk.

As regards typhoid fever, the chief seat of mischief is in the bowel. For about two weeks in the early stage of the disease the bacilli are present in the blood. Later they appear in the stools, and during convalescence they appear in the urine in about 25 per cent. of all cases.

Typhoid "Carriers."

Regarding the duration of the period of infectivity, recent bacteriological work has revealed some interesting facts. Formerly a patient after five or six weeks quarantine was supposed free of infection, and if sufficiently recovered, discharged as fit to return to work. But at this stage in about one half the cases the bacilli are being still excreted in the stools and urine, and this may continue for weeks or months in some cases; while in other more unfortunate cases it may continue for years, and such are now termed "chronic bacilli carriers." So long as excretion of bacilli continues such persons are potentially infective to others; and when such persons are engaged in dairy work or in the handling of food, there are serious risks of contamination through the hands becoming soiled with excreta in the performance of the ordinary toilet, and through gross and culpable neglect to wash the hands.

To what an extent infection is transmitted and spread in this way may be inferred, when we consider that it is only a few years since "bacilli carriers" were discovered, and since then several outbreaks have been recorded. In 1907 Dr. D. S. Davies, Bristol, describes two institutional outbreaks, where the "bacillus carrier" was acting as cook and dairy maid. In the New York Medical Record, 1907, Soper records that a cook, who in 5 years was engaged with four families, gave rise to 28 cases. In the previous year 31 cases occurring in 14 years in an institution in Scotland were traced to "bacilli carriers," and many similar cases have been reported in Germany.

Then in every infectious disease there are the "ambulant" and "missed" cases. In these cases the symptoms and illness are so slight that the real cause is not suspected and remains undiagnosed, yet these cases are infectious to others.

Lastly, outbreaks of typhoid fever have been clearly traced to dilution of the milk, and to washing of the milk vessels with sewage polluted water—Rochdale epidemic (see page 14).

Regarding the other infectious diseases, it has frequently been stated that smallpox, measles, and whooping cough may be conveyed by milk, but none of these statements are based on scientific evidence, and for the present must be considered not proved.

TUBERCULOSIS IN RELATION TO MILK.

Scientific and Experimental Evidence.

Every years sees the accomplishment of so much valuable work and the production of such a voluminous literature, that it is only here possible to summarise some of the more salient features of this complex problem as it presents itself to-day to health authorities.

Koch in 1882 first announced to the world his discovery of the bacillus tuberculosis. It was an epoch-making discovery and will ever remain as a classical masterpiece of bacteriological research. Tuberculosis is the most widely spread of all diseases affecting humanity and still produces the highest mortality; still claiming its title as the "Captain of men of death" (Bunyan). Out of every 9 deaths in Rochdale one is due to some form of tuberculosis. No disease affects domestic animals more widely, and amongst these none are more susceptible than the bovines, which include the domestic cow.

In his original paper (1882) Koch clearly and definitely stated that he was of opinion that bovine tuberculosis was identical with human tuberculosis and therefore a disease transmissible to man, which should be treated as any other infectious disease. At the British Medical Congress on Tuberculosis, London, 1901, Koch, from certain experiments and observations then submitted, stated that human and bovine tuberculosis are practically distinct, and that if man is susceptible to the latter, infection is rare.

So important was this pronouncement and so far-reaching were the consequences it was destined to exercise on the whole question of preventive medicine, that a Royal Commission was appointed that same year to investigate and report on the whole question.

In January, 1907, they issued a second interim report; and as this is the last and most authoritative scientific tribunal which has sat on this question their conclusions and verdict are given verbatim:—

"There can be no doubt but that in a certain number of cases the tuberculosis occurring in the human subject, especially in children, is the direct result of the introduction into the human body of the bacillus of bovine tuberculosis; and there also can be no doubt that in the majority at least of these cases the bacillus is introduced through cows' milk. Cows' milk containing bovine tubercle bacilli is clearly a cause of tuberculosis and of fatal tuberculosis in man. Of the 60 cases of human tuberculosis investigated by us, fourteen of the viruses belonged to Group I, that is to say, contained the bovine bacillus. If, instead of taking all these 60 cases, we confine ourselves to cases of tuberculosis in which the bacilli were apparently introduced into the body by way of the alimentary canal, the proportion of Group I becomes very much larger. Of the total sixty cases investigated by us, twenty-eight possessed clinical histories indicating that in them the bacillus was introduced through the alimentary canal. Of these thirteen belong to Group I. Of the nine cases in which cervical glands were studied by us, three, and of the nineteen cases in which the lesions of abdominal tuberculosis were studied by us, ten belong to Group I. These facts indicate that a very large proportion of tuberculosis contracted by ingestion is due to tubercle bacilli of bovine source. A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cows' milk containing tubercle bacilli. The presence of tubercle bacilli in cows' milk can be detected, though with some difficulty, if the proper means be adopted; and such milk ought never to be used as food. There is far less difficulty in recognising clinically that a cow is distinctly suffering from tuberculosis, in which case she may be yielding tuberculous milk. The milk coming from such a cow ought not to form part of human food, and indeed ought not to be used as food at all. Our results clearly point to the necessity of measures more stringent than those at present enforced, being taken to prevent the sale or the consumption of such milk."

This may be stated more simply as follows:—

The Commission confirmed what had already been pointed out by earlier observers, and regarding which all are now agreed; that there are two chief types of the tubercle bacillus—a human type and a bovine type. In human tuberculosis the former type is present in the great majority of cases, and in a certain proportion of human cases the bovine bacillus is now known to be present, and setting up bovine tuberculosis in the human subject. The bovine bacillus, on the other hand, is always present in bovine tuberculosis and appears to be the organism prevalent in animal tuberculosis.

In their biological, cultural and pathogenic properties there are some slight differences between these two types of bacilli. The bovine bacillus is much more virulent towards the lower animals than the human bacillus; but it does not appear to be equally virulent in the case of the human subject; for in the case of children suffering from primary intestinal and glandular tuberculosis which is usually caused by the bovine bacillus, through the ingestion of tubercular milk, the condition nearly always shows a certain degree of chronicity, which probably indicates a lower degree of virulence towards the human subject. But having regard to these differences the tuberculosis set up by the bacillus of human tuberculosis and bovine tuberculosis is, so far as anatomical and histological and clinical features are concerned, one and the same disease.

Then since man is and children are very susceptible to infection by the bovine bacillus through tuberculous milk and otherwise; and since animals can be infected experimentally by the human type; therefore, man and bovine animals are reciprocally infective.

The Commission examined the tubercular material from 60 cases of human tuberculosis and sub-divided their results into three groups—Group I, Group II, and Group III. Groups II and III are not here considered as the bacillus found present in these groups was chiefly of the human type. But into Group I they placed 14 cases, or 23 per cent., of the whole, in which they found the bovine bacillus present. These were all cases of young children, and in 13 of the 14 cases the primary affection appeared in the intestinal tract, and in only one case was the bovine bacillus found in sputum. Altogether in 28 cases out of the 60 the history indicated infection by feeding through the alimentary canal. For in 9 cases of tubercular glands of the neck in children, the bovine bacillus was found present in 3; and, in 10 out of 19 cases—all children—the bovine bacillus was isolated from tubercular intestines, tubercular peritoneum and abdominal glands. That is out of the 28 cases, 13, or 46 per cent., showed the presence of the bovine bacillus; and, since these were all cases of children, the Commission considered they had the strongest evidence in coming to the above-mentioned conclusion; that these 14 cases in Group I were in reality cases of bovine tuberculosis occurring in man; and consequently, that a very large proportion of tuberculosis, especially amongst children, is contracted by ingestion of tuberculous milk; and, in urging the necessity for more stringent measures to be adopted by sanitary authorities to prevent the sale and consumption of tuberculous milk.

It may be further noted that in nearly all cases where the bovine bacillus has been isolated from a human subject, they have been cases of children with some evidence of infection through alimentation by ingestion of tubercular food or milk.

A similarly appointed Commission—the German Imperial Commission—have had the same questions under consideration, and their report has recently been issued by Dr. Weber. This report is in substantial agreement with the report of the English Commission. Dr. Weber states that in 84 cases of tuberculosis in children which he exhaustively examined, he found no less than 21 infected with the bovine bacillus. Thirteen occurred in primary abdominal tuberculosis, six in cases of tuberculosis of neck glands, whilst in 18 cases of tubercle of the lung all gave bacilli of the human type.

Two of the earlier observers and ablest exponents of the ingestion theory of tuberculosis were Von Behring and Calmette. The former, four years previous to the issue of the above interim report, at Cassel in 1903, stated that infection in the great majority of cases took place in infancy through tubercular milk by way of the alimentary canal, and that consumption in the adult was frequently due to this primary infection in infancy; that the bacillus tuberculosis can pass through the wall of the intestine and leave no wound nor trace behind to mark its passage; and then appears to take up its abode probably in some abdominal gland structure, where it may remain in the body inactive for years, and at a later period in life become active and virulent at some inopportune moment, when through illness or otherwise the resisting powers of the individual has been temporary lowered. At first this theory was received with considerable scepticism.

But through the experimental work of Calmette and Guerin and their pupils, which appeared in three memoirs published in the *Annales de l'Institut Pasteur*; the accumulating evidence of many workers and observers in different parts of the world; and the above report of the Royal Commission; we are now convinced that there is in this theory much truth. It is not within the scope of this report to discuss the experimental work on which this theory is based, but one of Calmette's earliest observations is extremely interesting, as it has a counterpart in daily life which is seen by every medical practitioner. The experimental animals used were chiefly goats, kids, and bovines; while human, bovine, and avian tubercular material was introduced into these animals in various ways—by injections, suckling previously infected mothers, feeding, etc. After the death of the animal, or if killed, after a certain experimental time, a careful examination was made. It was observed that if young animals were fed on tubercular material the form of tuberculosis that generally followed was of the abdominal type. The mesenteric and abdominal glands first became affected, setting up a form of tabes mesenterica in the young animal. This was followed in some cases at a later date by infection of the lungs and in some cases, when the animal lived long enough, the deep cervical glands of the neck were frequently found to be tubercular. This last phase was of great interest, because up to this time tubercular glands of the neck were generally supposed to be due to infection through the mucous membrane of the mouth, tonsils, and pharynx; the bacilli, air-borne, entering the mouth in breathing or deposited on the inner surface of the mouth in feeding.

But it was further shown by Calmette and others that if the tubercular material was introduced by a tube into the stomach of a tuberculosis-free animal so as to avoid infection by the mouth, the initiation and progress of the disease was just the same as above stated. On the other hand the same experiments performed on adult animals appeared to produce tuberculosis of the pulmonary type—a form of pulmonary phthisis. The exact counterpart is seen in human beings. Tuberculosis of the glands, and especially the abdominal glands—tabes mesenterica or consumption of the bowel—is one of the common forms of tuberculosis in children; while phthisis pulmonalis, or consumption of the lungs, is the prevalent form of the disease in adults.

To facilitate the understanding of these important experimental results, and the explanation offered, I will venture to put the matter simply and briefly. There are in the human body two great vascular systems—the circulation of the blood and the circulation of the lymph, and both are continuous the one with the other. The former is maintained by the heart and blood vessels. These vessels in their ultimate ramifications amongst the tissues may vary from $\frac{1}{2000}$ to $\frac{1}{3000}$ inch in diameter, and there from networks, the interstices of which are often less than the diameter of the vessels. From these microscopic thin walled capillaries or vessels some of the more fluid portion of the blood is continually oozing out and carrying with it food for the tissues. This fluid which is now lying amongst, and bathing the tissues, and from which the tissues are taking up food and returning to it their waste products is called the lymph. This lymph is now collected and returned back to the blood by another set of vessels, which constitute the lymphatic system. But this lymph containing much waste products must be re-organised before being returned to the blood, and this is accomplished by numerous small structures situated along the route of the lymphatic vessels called lymphatic glands, and through which the lymph passes. Now, since the minutest structures—the tissue elements—in the human body are all microscopic and are bathed in lymph, we can readily understand that if tubercle bacilli should enter the mouth and gain an entrance through the mucous membrane or lining membrane of the mouth, then they are within the lymphatic system; and since the direction of the lymph is always first towards the lymphatic glands, the bacilli will probably be carried by the lymph stream to the nearest lymphatic glands of the neck.

On the other hand, if tubercle bacilli by ingestion of food or milk should be carried to the bowel, and gain an entrance through the mucous membrane or inner lining of the wall of the bowel, then they are also within the lymphatic system, and will probably be carried by the lymph stream to the nearest lymphatic glands situated in the membrane which surrounds and supports the bowel, called the mesentery; and hence the origin of the terms, mesenteric glands and tabes mesenterica, which means a wasting or consumption of the glands of the mesentery.

Then again, there are considerable differences in structure and arrangement of parts in the lymphatic glands of young and adult animals. In the young animal it is such as to offer considerable obstruction to the passage of the bacilli; whereas in adults it is such as to more readily allow the passage of bacilli through the gland and ultimately into the blood circulation, in which they are carried directly to the lungs.

But another of the duties of these glands is to destroy intruding bacteria; and the gland itself often becomes a battle ground, and as appears in the case of young animals and children, the glands offer a more determined resistance than in adults. If victory is with the gland, then the bacilli are destroyed or rendered innocuous. If the bacilli are victorious, then they may either (1) cause the glands to become swollen and break down as seen in the enlarged glands of the neck, and the mesenteric glands of tabes mesenterica (commonest in children); or (2) getting through the glands they may reach the lungs and set up phthisis pulmonalis (commonest in adults).

Such, then, is the explanation offered by Calmette and others for the prevalence of the glandular form of tuberculosis in children and the pulmonary form in adults.

This experimental work of Calmette and his followers has been greatly extended and, on the whole, confirmed by many workers and by a very interesting series of experiments carried out by Sir Wm. Whitla and Professor Symmers, of Belfast.

More recently some very instructive results have been obtained by inhalation experiments. Rabbits, guinea pigs, and other small animals were placed in an atmosphere laden with fine black particles of carbon or coal dust or Chinese ink. After different periods of time the animals were killed, and the course taken by the carbon particles readily traced. In all cases the upper air passages were found laden with fine carbon particles. But as regards the rabbit, which is a nose breather, the particles did not appear to have got further than the upper parts of the trachea, or wind pipe, and in the other animals the particles never reached the lung unless the animal was made to breathe in this atmosphere for a long time.

In consequence of such experimental work, many eminent workers in this field of research are of opinion that, not only is the ingestion theory the most probable, but discuss the improbability of infection of the lungs by inhalation, unless it occur through the upper air passages, where the bacilli may be deposited by inhalation or ingestion of food, and then find an entrance by passing through the mucous membrane, and especially through the tonsils. They are then carried by the lymph stream in the first place to the glands of the neck, and finally to other parts of the body by means of the lymph and blood circulation.

They further advert to what is well known to every student of physiology: that the pathway from the nostrils to the lungs is so well guarded by physical barriers in the form of angles, bends, and turns; that bacilli, dust, and foreign matter are obstructed and caught in these parts; while again in a large part of this passage are living structures, so numerous as cannot be numbered, which like serried ranks of men with brooms maintain a constant strong outward sweeping motion. The effect of this is to try and expel all intruding germs and foreign matter, just as is seen and as one experiences when a crumb of bread or a drop of fluid attempts to go down the wrong way.

Although these investigations cannot be further considered here, I have discussed them at some length, as they direct attention to a subject hitherto not sufficiently appreciated, namely—the great risk of tubercular infection through the ingestion of tubercular milk and meat.

Post-mortem Evidence in Relation to Tuberculosis in Children

Important evidence and statistics bearing on this important question of tubercular infection through milk, are now available from the records of examination of cases post-mortem. Such statistics are invaluable when collected with care by pathologists of high reputation, and when due care has been taken to differentiate between whether the intestinal tuberculosis was primary or secondary in origin. In this country Dr. Still, at the Sick Children's Hospital, Great Ormonde Street, London; and Dr. Shennan, Royal Hospital for Sick Children, Edinburgh, have tabulated with great care their examinations of two series numbering 547 children, who died in these institutions from tuberculosis. The former found 29.1 per cent., the latter 28.1 per cent., of the cases examined that showed definite evidence of primary intestinal infection.

The number is considerable, and provides the most trustworthy evidence we have of the extent to which children contract primary intestinal tuberculosis.

Further, it has to be kept in view that only a portion of those who become infected in infancy die in infancy, many who become infected may recover, while many may survive with varying health to die in adolescence or at some later period.

Similar pathological records of the prevalence of tuberculosis in children are now available from many hospitals and other institutions in Germany, France, and America; and from the published statistics and views of many pathologists, we learn that, while congenital tuberculosis is just as rare in babies as in calves, and is seldom met with in infants under three months; that after this age it increases progressively through childhood, and the frequency with which intestinal and other forms of tuberculosis is met with in children varies in different places. In Munich it is recorded as occurring in 38 per cent.; in Keil, 40 per cent.; London, 13 per cent.; Edinburgh, 27.8 per cent.; Paris, 38.5 per cent.; Christiania, 42.5 per cent.; Vienna, 40 per cent.; stating the question more broadly, evidences of tubercular infection are met with in about 40 per cent. of all children dying under 15 years of age. In American hospitals the percentage is probably less, as this disease is not so prevalent in that country.

Sims Woodhead also found that out of 127 cases of tuberculosis in children the mesenteric glands showed tubercular infection in 100, and in 43 there was present ulceration of the intestine.

Prevalence of Tuberculosis in English Milking Herds.

Since from the above statistics we can only form an approximate estimate of the extent to which children become infected by tubercular milk, it forms a very interesting source of information to enquire to what extent bovine tuberculosis exists amongst English milking herds, and thereby form some estimate of the existing dangers through drinking tubercular milk.

It is computed that 20-30 per cent. of all the milch cows in England are more or less affected with tuberculosis. But a cow may be more or less affected with tuberculosis and not producing tubercular milk, and on the other hand a cow may show no external signs of tuberculosis and yet be giving tubercular milk.

When the udder is infected, which is invariably secondary to diseases of the internal organs, the milk will always be infected and dangerous; and it is calculated that about 2 per cent. of our milch cows have tuberculous udders. There are over 4,000,000 milch cows in Great Britain, which gives 80,000 with tubercular udders. Putting the annual yield of 500 gallons of milk per cow, there is produced every year 40,000,000 gallons of milk, which if not actually virulent, is not above suspicion.

This infected milk mixes with the pure, and on examination 10-15 per cent. of the mixed milk as supplied in towns show the presence of tubercle bacilli. The mixing of the tubercular milk with the non-tubercular is one safeguard which diminishes the risk of infection. For it has been clearly proved that there is a minimum limit to the number of bacilli required to produce active tuberculosis; and, consequently, the reason why so many escape, is probably, because after dilution the number of bacilli it contains is small and below the minimum. If tubercular milk were consumed by itself, many would become infected. Such milk when injected into small animals such as guinea pigs, kittens, rabbits, calves, etc., is often capable of setting up acute tuberculosis, and these animals are not any more susceptible to tuberculosis than babies. Even tuberculous milk when diluted proves too frequently infective, but the danger to the consumer is in inverse ratio to the degree of dilution.

Evidence from Statistics of Registrar General.

Again, turning to the reports of the Registrar General, we find that during the past half-century there has been a marked decline in the death-rate from phthisis, which is the form that tuberculosis generally takes in adolescence, and when the bacilli are inhaled as from dried sputum. On the other hand, during the same period, while there has been a slight decline in the death-rate at all ages above 1 year from tabes mesenterica or "consumption of the bowel," which is that form of tuberculosis attributable to alimentary infection or infection through ingestion of food or milk; yet among infants under 1 year of age, not only has there been no decline, but an actual increase in the death-rate from this form of tuberculosis.

In some respects, however, these reports, although true in general, are not so trustworthy as the preceding data, because such returns must vary according to variations in diagnosis, etc. The decline in the phthisis death-rate is undoubtedly due to the gradually improving hygienic conditions under which the people live and work, and to a higher standard of living now attainable. During the same period cows' milk has entered more largely into the dietary of young children, and, as regards infants, on account of the great decline in breast feeding, in many towns of England 50-60 per cent. of them have to depend entirely on cows' milk; and while at the same time we find an increasing death-rate from tabes mesenterica, there appears a possible relationship of cause and effect; and more so when we consider that the improvement in the hygienic conditions of the people has not yet very appreciably extended to the cowshed and the conditions under which milk is produced, and consequently, that infection through milk has remained unchecked and in infants increases in proportion as bottle feeding on cows' milk increases.

Discussion and Conclusions.

In reviewing the whole question and weighing the evidence as set forth above, we readily admit that whatever deductions or conclusions are arrived at one must keep in view the following facts.

That the diagnosis of primary intestinal tuberculosis as has been so frequently pointed out by Koch and others is difficult and often uncertain, and in any case it cannot be considered as the only criterion of tubercular infection by means of milk.

Again, children readily swallow their pulmonary expectoration and thus secondary infection of the intestine may rapidly follow primary infection of the lungs. Hence, tabes mesenterica or consumption of the glands in the abdomen, although always associated with infection through the bowel, cannot always be taken as evidence of infection by food or milk.

Further, we have to keep in mind that at the present moment a great deal of experimental evidence is being brought forward to prove by which path infection takes place most readily—by inhalation or ingestion. The increasing experimental evidence in support of the ingestion theory and its practical importance in dealing with milk supplies, has been described at some length. On the other hand, the experimental work of many of the German School of Pathologists demands equal consideration. During 1908 a great deal of experimental work was carried on, especially at the Hygienic Institute of the University of Breslan, by Reichenbach, Heymann, and others. The former, in his report, states that 40,000 bacilli, introduced in the form of a fine spray, produced infection by inhalation in guinea pigs; and on the same animals it took a minimum of 140 million bacilli; or 3,500 times as many, to produce infection by feeding or ingestion. Hence, these experimenters conclude that infection by inhalation is quicker and more certain, and takes place with much smaller doses than by ingestion. This result they ascribe to the bacilli that are carried direct into the lung during inhalation. This question, however, must be considered still sub judice.

Further, when we find that in some countries, notably China, where cows' milk is seldom or never used; Japan, where the cows are tuberculosis-free; Greenland, where no cattle are to be found; and even in some parts of England, where from various causes little milk is used, tuberculosis is equally prevalent; we have important facts which are difficult to reconcile with present ideas as set forth above, and for which some other explanation has to be found. It appears to me that we have not yet sounded the lowest depth of this difficult problem and that tubercular milk is only one, although a dangerous one, of the many complex factors operating on the health conditions of every community.

In the present state of our knowledge it appears that, while we are not justified in accepting Von Behring's theory in its entirety—especially as regards consumption in the adult being always due to infection from milk in infancy—the older theory that infection always took place by breathing must now be considered no longer tenable and must be greatly modified. The accumulating evidence that the bovine type of bacillus (the bacillus found in tubercular milk) is so often discovered in children suffering from tuberculosis of the bowel and abdominal glands, as well as the large amount of experimental evidence, not only strongly supports the ingestion theory but further clearly points out the direction for administrative measures. For it is probably correct to say that at least 25 per cent. of all forms of tuberculosis in children in this country is caused through drinking tubercular milk. The disease first shows itself as a primary intestinal tuberculosis, and that in 70-80 per cent. of such cases the mesenteric glands become affected, and present the usual clinical appearance as in tabes mesenterica.

The above conclusion is in no way invalidated, even if we agree with Reichenbach, Heymann, and others, who maintain that infection takes place more certain, and quicker, and with smaller doses, by inhalation than by ingestion. This evidence is also in agreement with the experimental work of the English Royal Commission, and certainly in accordance with every-day experience. For, while 10-15 per cent. of the raw milk consumed is tubercular, the conditions are amply provided for wide-spread infection taking place in every community; yet, only a comparatively small number of individuals thereby contract tuberculosis.

We have already adverted to one safeguard against infection, provided by the mixing of the tubercular with the non-tubercular milk; and we may now add that in accordance with the above evidence, the rationale of this procedure evidently depends on the fact, that infection through the intestinal tract by ingestion requires larger doses of bacilli to produce the same effect, than what is required by inhalation; and as there is a minimum limit to the number of bacilli required to produce active tuberculosis by either theory, dilution of the tubercular milk tends to prevent the number of bacilli rising above the dangerous or minimum limit.

There is thus so far no essential difference, in principle, between the two schools. The older inhalation school now readily admit that infection takes place by ingestion, but not to the same extent as is proved by the experimental evidence of the ingestion school; but this is only a difference in degree, which time, with accumulating evidence from careful observation and experiment, will remove, either in favour of the one school or the other. Wherein they do differ is, that the inhalation school maintain that the bacilli are carried direct to the lungs in breathing, and hence the certainty and rapidity of infection by inhalation; whereas the ingestion school bring forward evidence to show, that it is difficult for bacilli to reach the lungs by this method, although they admit that infection may take place through the respiratory upper passages. From the point of view, however, of public health administration, this part of the discussion is more academic than practical. To health authorities the broad and incontrovertible facts are as above stated, and as guardians of the public health, England will expect all health authorities to avail themselves of the additional powers contained in the Tuberculosis Order, 1909; and make one combined effort to extirpate bovine tuberculosis, which we now know is transmissible to human beings by tuberculous milk, and is the cause of at least 25 per cent. of all forms of tuberculosis in children, and of an amount of loss, suffering, and race deterioration, of which statistics make no record.

Having regard to the above conclusions, it may be here noted that Dr. Nathan Raw has recently put forward an ingenious theory, which is based on clinical and pathological observations, which may be briefly summarised as follows:—

Pulmonary tuberculosis, on the one hand, is a disease nearly always strictly limited to the lungs and is essentially a disease of young adult life between 30-40 years of age; on the other hand, abdominal tuberculosis with tabes mesenterica, tubercular joints, spinal disease, enlarged glands, and strumous conditions are all essentially diseases of infancy and childhood, and very rarely seen in adult life. Further, it is very seldom that a patient suffering from any of the latter forms of tuberculosis develops the pulmonary form of phthisis pulmonalis. Clinically, they appear to be antagonistic to one another, attacking the body at different periods of life and exhibiting generally opposite symptoms. To explain these observations, Nathan Raw advances the theory that, while the human body is susceptible of attack by both the human and the bovine type of bacillus; yet these bacilli are antagonistic to one another, and do not attack the body simultaneously; that the human type of bacillus is conveyed chiefly by infective matter, such as dried sputum; and that its chief path of entry is, during the later periods of life, by the respiratory passages to the lungs where it sets up phthisis pulmonalis. On the other hand, during the early years of life, the bovine bacillus gains an entrance to the human body by the ingestion of tubercular milk, and is the casual micro-organisms of all the diseases of infancy and childhood enumerated above.

Although space will not allow of a discussion of this theory, yet I have included it here, because in reviewing the experimental work and arguments given in the preceding pages one must admit that the theory is not without considerable support. Further, the antagonism between the two types of bacilli appears to be corroborated by Von Behring and Römer, in some of their recent experiments on the immunisation of bovines by human bacilli against bovine tuberculosis. Hence, if human bacilli protect bovines against bovine tuberculosis, is the converse true, *i.e.*, does bovine tuberculosis in children protect them against human tuberculosis or phthisis pulmonalis? The affirmative is the natural deduction. But, although the theory is ingenious, and attempts to explain away many of the difficulties which at present beset the problem of tuberculosis, we must await the final verdict of scientific evidence.

Environment.

While discussing tuberculosis and its different modes of infection—by inhalation and by ingestion—and their relative frequency and dangers, it appears opportune to note that this question has an obverse side, which although not so frequently commented on, is equally important, and that is the environment. In tuberculous and dirty milk there is the attacking party — the bacillus of tuberculosis and probably other pathogenic micro-organisms. But there is the defending party—the individual attacked, and with every individual must be associated the environment (housing, feeding, social, and economic habits).

For, as a general truth, it may be said, that in proportion as the environment is good or bad, so will be the defensive powers of the individual attacked.

We all live and breathe in an atmosphere more or less in different places laden with tubercle bacilli; and there must be few who have escaped at some time or other drinking tubercular milk. Yet we do not all suffer from tuberculosis. Recently, it has been clearly demonstrated that the tubercle bacillus just like the bacillus of diphtheria, pneumonia, and others, may be found in the throats and nasal cavities of persons in perfect health, and appear to do no harm so long as health remains good and the defensive powers of the blood and tissues active and vigorous.

Either the bacilli are prevented from gaining an entrance into the tissues and blood, or if they do gain a foothold at some wound or weak part, there is immediately thrown round them a cordon or surrounding wall of defence, and by this and many other modes of warfare the bacilli and their toxins are either annihilated, rendered harmless, or converted into innocuous products.

The truth of this is borne out when we consider the large number of cases which reach the post-mortem room, in which we find, especially in the lungs and glandular structures, traces of healed scars and small areas which at one time in the life history of the individual was the scene of a battlefield between the intruding bacilli and the defending powers. In recent years many British pathologists have given this subject considerable attention, but as yet the views and statistics given by different observers regarding the probable percentage of such cases varies within wide limits. From some other countries, especially Germany, statistics on this point are more readily available. From statistics collected by Professor M. Hay, Aberdeen, I learn that Burkhardt, in between one and two thousand autopsies at the Dresden hospitals, found tubercle in 91 per cent. of all persons dying above 18 years of age, and 38 per cent. among persons under 18 years. Naegeli, in Zurich, made also an extensive number of autopsies, and found that as he became more familiar with the search for tubercle 97-98 per cent. of all the bodies of persons dying in hospital above 18 years of age showed traces of tubercle. In persons under 18 years of age the proportion was 18 per cent. These figures include all bodies of persons dying ostensibly of tubercular disease, as well as the bodies of persons dying from all other causes.

Harbitz, of Christiania, who has given considerable attention to the study of the pathology of tuberculosis in children, and after having performed an extensive number of autopsies, comes to the conclusion that 50-60 per cent. of all cases dying under 15 years of age show traces of obsolete or latent tuberculosis, occurring principally in the glandular structures.

That the defending powers were victorious in so many cases is commemorated by the slight destruction of tissue and the healed scar, but had the former—the bacilli—been victorious, then was established in that individual, phthisis pulmonalis.

These facts sufficiently demonstrate how important a factor, in the life history of every individual in the struggle against the microbes of disease, is the power of resistance, which again greatly depends on one's health, strength, and vigour, and these again in their last analysis are dependent on one's breeding and environment.

In recent years there has been possibly too great a tendency to attack the bacillus, while forgetting that to increase the powers of resistance of the people is equally important; and this can only be done by improving the conditions under which people live, more especially in the slums and poorer districts of every town where consumption in all its forms is most prevalent. For I am convinced that, with the environment favourable as regards sanitary housing and airspaces, a plentiful water supply, and the clean water-carriage system for the removal of sewage; such conditions would not only stimulate the greater number, but might even persuade the most careless to attempt to live cleanly, healthy, and vigorous lives: this combined with the proper cooking of plain nutritious food, and a reasonably pure milk; then, the bacillus tuberculosis will remain comparatively innocuous.

Section III.

DIRT OR FILTH IN MILK.

It will facilitate our appreciation of the due significance of this condition if we summarise what has been stated in the preceding pages. Therein, I have attempted to state briefly the evidence on which we consider that scarlet fever, diphtheria, sore throats, diarrhœa, typhoid fever, and tuberculosis are milk-borne diseases; and in doing so, I have pointed out that milk as it comes from a healthy cow is a pure sterile fluid; and, that man himself is chiefly responsible for the filth, dirt, and microbes in milk.

Human Sources.

Matter from the mouth, nose, and throat in coughing, sneezing, and spitting. Pollution from excrementitious matter; and from whatever the hands and clothes may happen to be soiled with at the time of milking and handling the milk.

Dirty Milk Utensils.

This is one of the most prolific sources of pollution of milk. Many of these utensils are simply swarming with bacteria; and to every fresh quantity of milk that enters, they contribute a countless number of microbes. The danger from this source is further increased, when we know that these utensils are often rinsed with water from a water supply that is not above suspicion.

Air and Dust.

Air and dust are correlated sources of the pollution of milk, and the impurities may be either of human, bovine, or other animal origin. One has only to enter a dirty cowshed, or one where the ordinary duties are ill-timed and ill-regulated, and observe the particles from the bacterial and dust-laden atmosphere being wafted into the milk, or settling down by the ordinary laws of gravity. Again, dust accumulates in the vessels set aside for the reception of milk, if not properly stored.

Artificial Pollution.

Milk is sometimes "watered," and we can understand that those guilty of this practice will not be too particular about the quality of the diluting agent.

Flies.

Flies are also, undoubtedly, carriers of filth and germs of disease into milk.

From the Cow.

The milk from cows with tubercular udders nearly always contains tubercle bacilli in great numbers; and sometimes also the milk of cows that are tubercular but as yet show no external signs of it. The discharges in coughing and sneezing, also faeces and urine, from all such cows contain tubercle bacilli. Pus, blood, and matter from purulent and other inflammatory affections of the udder, and from all forms of wet and dried excremental matter.

The accumulation of filth from these and other sources constitute the gross filth or slime in milk; the grosser filth, such as fragments of dung and debris, are separated in the process of straining, while the finer particles of filth and bacteria pass through and form the deposit at the bottom of a deep cone-shaped glass of milk when allowed to stand for a few hours. The various processes of separating and estimating the amount of filth or slime in milk are here omitted, as also its microscopic appearances. But, it has often occurred to me that, if only those concerned in handling milk could see the often nauseating and heterogeneous collection revealed by the microscope, it would appeal even to the most wantonly careless.

Significance of Filthy Milk.

It is admitted at once that there is a certain unavoidable and permissible amount of dirt in milk which for the most part may be quite innocuous in character; but by the popular expression "filthy milk," we mean milk that is unreasonably and grossly filthy. The amount of slime or filth in milk must always be taken as an index of the care and cleanliness exercised in the management of the cowshed, in milking, in handling the milk, and in its distribution. Still, it has to be borne in mind that there is no constant relationship between the amount of slime and the pathogenic properties of the milk. Some samples of milk may contain large quantities of dirt, which, although nauseating, may be found not to be very infectious nor pathogenic. Other samples may contain very little slime and yet be found on examination highly infectious and pathogenic. However, it will generally be found that there is a distinct average correlation between the amount of dirt and the pathogenicity of milk, and that the two generally rise or fall together.

It has further to be kept in view that the total sediment found in a milk does not represent the original total pollution.

From many experiments we know, that if a certain quantity of cows' dung be mixed with milk, only about ⅓ to ½ is recoverable in the sediment, the remainder being usually present in the form of water, soluble salts, extractives, etc. It may be here added that recently several dairymen have been prosecuted for selling milk which contained sediment and dirt above the admissible standard.

Manchester Investigations.

Perhaps in no city of England has more important work been done on the slime and bacteria of our milk supplies than in Manchester by Dr. Niven, Medical Officer of Health, and by Professor Delépine. The latter, during the past 10 years, has made a continuous record of his observations and experiments on the daily milk supply of Manchester, and his results are of the highest value both from the scientific and administrative point of view. Between 1898-1900, the average amount of slime arriving daily in 40,000 gallons of milk = 160lbs. In 1906 the average amount of slime arriving daily in 40,000 gallons of milk = 79lbs. It is calculated by experiment that 5 to 7 grains per gallon is unavoidable and permissible sediment, and milk not containing more may be considered reasonably clean. Deducting this quantity from 160lbs. leaves 120lbs. of objectionable filth, which was swallowed daily by the people of Manchester. In 1906 the quantity was reduced to 39lbs. daily.

Judging milk by this standard in Manchester, 40 per cent. appeared clean in 1898-1900, and 68 per cent. in 1906, an increase of 28 per cent. in 8 years.

In 1898-1900 the average was 12.5 per cent., in 1906 it was reduced to 5 per cent., while very dirty milks have now disappeared.

With this diminution in filth there is a corresponding diminution in the quantity of tubercular milk. From 1897 to 1906, 3,650 samples of mixed milk were examined for the presence of the bacillus tuberculosis. In 1897, 17.2 per cent. of the samples examined were tuberculous, and it was calculated that about 8,000 gallons of milk actually capable of causing tuberculosis was being distributed daily in Manchester. In 1906, the percentage of tubercular milk had fallen to 6.6 per cent., and the quantity of tubercular milk reduced to about 3,000 gallons per day.

However, it is disappointing to find, in spite of the vigorous crusade now carried on in Manchester for many years to provide a pure milk supply, that in reading Dr. Niven's Report for 1908, it is stated that during the year 334 samples of milk were taken, and on bacteriological examination it was found that 9.34 per cent. of the farmers were still sending tuberculous milk to the city.

Comparing this statement with the figures given in a recent article by W. G. Barnes, Chief Inspector of Dairies for L.C.C., we find that of 200 samples of milk taken haphazard at different railway stations in London, 37 or 18.5 per cent. of these milks were capable of setting up acute tuberculosis when injected into the bodies of guinea pigs. In the Manchester area, up to the end of 1907, 154 tubercular cows had been slaughtered, whilst in Sheffield at the end of 1908, 122 had been slaughtered. These statements serve to emphasize the magnitude of this question, and show how necessary is combined action by every health authority in England before any real progress can be made.

Still, in spite of the retarding difficulties of isolated action, many health authorities continue to make progress towards the ideal of a reasonably pure milk supply; and this has been attained by carrying out, with zeal and fidelity, the various powers conferred by Act of Parliament for the control of milk supplies. When, in 1899, the Dairies, Cowsheds and Milkshops Order was amended to include that milk from tubercular cows was neither to be mixed with other milk nor to be sold as human food, many Corporations, including Rochdale, readily incorporated in their Local Acts the additional though still inadequate powers for dealing with tuberculous milk. But the manner in which these powers have been exercised by different authorities, are as diverse as interesting. Many urban authorities through the well-directed, and well-sustained activity and co-operation of their respective public health and bacteriological departments, have already done a great deal to eliminate tuberculous milk. This has implied the systematic and frequent inspection of all milking herds supplying milk within their respective districts, and the isolation and slaughter, when possible, of all cows discovered to be tubercular by inspection, by means of the tuberculin test, or by bacteriological examination of the milk. But there are some urban, and especially rural authorities, who exercise little or no control over the conditions of milk supply within their respective districts. Hence it is that these conditions in country districts are generally found to be much worse. Consequently, the milk when examined usually contains more filth and bacteria than milk produced in the towns where inspection is more thorough.

The failure of so many authorities to exercise the powers conferred on them, has done a great deal to retard any universal and national progress being made towards the extirpation of bovine tuberculosis; and it has also had some interesting local effects. In virtue of the 1899 Amending Order, a health authority can prohibit any dairyman, either within or without their district. supplying milk within their district from any tubercular cow; but, they cannot compel, they can only persuade, that such animals should be slaughtered. Such cows are then of no further value to the dairyman for milking purposes, in the district of an authority where there is systematic and thorough inspection. Consequently, these cows are often sold or transferred to the milking herds in districts where the health authorities are more quiescent and tolerant of bovine tuberculosis. Hence, it comes to pass that the inhabitants of the latter district may not only suffer through the dissemination of tuberculosis by tubercular milk from cows within their own district, but such a district becomes a sort of dumping ground for tubercular cows, whose number is continually augmented by transference of such cows from their more active and contiguous neighbours.

Section IV.

BACTERIAL STANDARD FOR IMPURITIES IN MILK.

During the past few years much valuable work has been done with the view of being able to establish a reasonable and practical bacteriological standard. The subject is a difficult one, and many workers have tried to solve it in different ways. However, one can now perceive the various results all converging to the establishment, in the very near future, of this most desirable standard.

The bacteria in milk, which appear to serve as the most useful and generally accepted index of pollution, are:—

(1) Streptococci, (2) bacillus coli communis, (3) bacillus enteritidis sporogenes.

These three types of micro-organisms are present in great abundance in the intestinal excreta of man and animals, and, hence, as they are considered characteristic of intestinal sewage and filth pollution, they are consequently taken as a measure of the degree of its presence. This is done by finding the number of these organisms present in a definite quantity—in this case finding the number of these organisms present in a certain quantity of milk.

There are, however, two factors which profoundly influence the number of bacteria present in milk. These are temperature and time. The higher the temperature and the longer the time since milking, the greater is the multiplication of bacteria and their toxic products. Hence, the difficulty has been to fix the conditions on which the bacteriological standard is to be based, especially as regards the temperature at which the milk is to be kept and examined.

The opinion is now almost unanimous that milk, immediately after milking and straining, should be cooled or chilled to a temperature of 10° C. or 50° F., and, as far as possible, maintained at that temperature. In New York milk above 50° F. is defined as adulterated, and wherever found in the hands of dairymen or retailers is liable to summary destruction. Chilling the Milk.

The reasons for chilling are:—

(1) Milk is unfortunately a medium eminently adapted for the growth of bacteria.

(2) Under ordinary conditions of milking and manipulating the milk, there is no absolutely clean milk. Some sediment and bacteria will always find an entrance.

(3) If the milk is chilled to 50° F., the multiplication of the bacteria that have gained entrance is inhibited. If this is not done, even the few bacteria, which may gain entrance into the milk at a cowshed, where scrupulous cleanliness is observed, will, in a few hours in a warm summer day, multiply to millions; so that this milk when examined a few hours after milking may be no better, or even worse, than a milk examined immediately after milking, where cleanliness is not observed. By chilling the milk we eliminate the factor time if the milk is examined within 24 hours after milking.

With these conditions it now becomes possible to adopt a bacteriological standard, the aim of which is to ascertain the amount of filth and bacteria that entered at the cowshed, which is the chief source of pollution. Then, as a permissible and unavoidable sediment content of 5-7 grains per gallon is allowed; so a provisional permissible bacterial content has to be allowed. This is determined as follows:—Many milking experiments are made with the cowsheds, cows, milkers, utensils, etc., in every possible condition, from the scrupulously clean to the very dirty. The number of bacteria present under these different conditions in a small quantity of milk—one cubic centimetre = 15 drops—is determined, and a reasonable number of bacteria decided on as permissible and unavoidable, when the operation of milking and treating the milk is performed with ordinary cleanliness. From many such experiments when due cleanliness is observed, about 15,000 to 50,000 micro-organisms in 1 c.c. is considered permissible; as the conditions vary from cleanliness to very dirty the number of organisms also increase, and in a dirty milk may amount to millions per c.c. of 15 drops. Milk as sold on the street, or from the retailer's shop, frequently shows an average of about ¼ to ½ million micro-organisms per c.c.

It is thus possible to classify milks as good, fair, bad, very bad, according to their bacterial content, which is also an index of the cleanliness obtaining in the different cowsheds at which the respective milk is produced.

This method has been generally adopted in America, and by Dr. Orr in his valuable report (1908) to the joint health councils of the county boroughs of the East and West Ridings of Yorkshire, on an investigation as to contamination of milk. His work extended over one year, and as he examined a very large number of samples of milk, his results may be considered as fairly representative of the present conditions of the milk supply in Yorkshire. I have summarised some of his results in the following table:— Yorkshire Investigations.

TABLE I.

GROUPS.	No. of samples examined	Average bacterial content per c.c. = 15 drops.	Percentages.					
			Source of supply.		Condition of udder.		Lighting and ventilation of cowshed.	
			Town	Country	Clean	Dirty	Good	Bad
Group A. (under 15,000 bact. per c.c.) .... .GOOD	8	8,920	25	4·1	15·2	3·7	16·7	5·4
Group B. (under 50,000 bact. per c c.) ....FAIR	34	28,530	50	44·9	56·5	29·6	58·3	35·1
Group C. (under 100,000 bact. per c.c.) ....BAD	15	74,480	12·5	24·5	13	33·3	11·1	29·7
Group D. (over 100,000 bact. per c c.) VERY BAD	16	240,450	12·5	26·5	15·2	33·3	13·9	29·7

This table deserves serious consideration. We have here experimental evidence of what is our daily experience—that the conditions under which milk is produced in country dairies are very much worse than in town dairies, where inspection is more efficient. That the cleanliness of the udder on account of its liability to excretal pollution, and consequently to pollute the milk, is of the highest importance. The effect of bad ventilation and lighting will be noted. Cleanliness and a low bacterial content are not impossible even under these conditions. But it is again our experience, and borne out by experiment, that those dairymen who, through ignorance, indifference, or laziness, are content with disorderly cowsheds, are not the most likely to make an extra effort to compensate the condition and obtain a clean milk. Hence, in all ill-ventilated and ill-lighted cowsheds, where darkness prevails and sunlight, the best of all disinfectants, is excluded, dirtiness and bacteria are encouraged and flourish; and, consequently, the milk is usually filthy with a high bacterial content.

It is interesting to know where this vast assemblage of 15,000 to 50,000 bacteria per c.c come from, which at the present time may be considered a provisionally permissible bacterial content. They come from two sources:—

(1) Milk as it is secreted in the udder of the cow is a pure sterile fluid, but as it passes through the teats it becomes contaminated with bacteria which have gained entrance during the intervals of milking. The number from this source is, however, comparatively small, and will be found chiefly in the fore milk, that is in the first "draw," less in the mid milk, and least in the "strippings." If the fore milk—first "draw"—be rejected the number of bacteria from this source is reduced to a minimum and the loss of milk is small, as the fore milk is poor in milk fat; while the "strippings" are rich in milk fat and contain fewest bacteria.

(2) The remainder come from extraneous sources in the process of milking and handling the milk, and are a liberal allowance for various contingencies even when due care and cleanliness is generally observed. However much the number goes above 50,000 per c.c. must be debited to, and is the measure of, preventible uncleanliness and carelessness.

I will here append the conclusions arrived at by Dr. Orr in his report to the joint health councils of the County of Yorkshire. These conclusions are based on experimental evidence and most reliable data, and consequently, are both instructive and important:—

"The chief conclusion to which we are forced is that the greatest amount of contamination of the milk supply takes place at the farm. This is based on the results of the experiments, which showed that—

(*a*) Of the total organisms in the milk used by the consumer, the greatest number are contributed by the farmer. During railway transit, at the retailer's premises, and in the consumer's house, smaller amounts are added, the amount in each instance being apparently about the same.

(*b*) Of the glucose fermenting, or intestinal organisms such as the bacilli coli communis type and the streptococci, by far the greatest number are added at the farm. The retailer adds a certain number, the consumer none.

(*c*) The sediment or "dirt" gains entrance to the milk chiefly at the cowshed. In 86.8 per cent. of the samples examined, there was no increase in the sediment when sold by the retailer, but a decrease in 68.8 per cent.

(*d*) The farmer was responsible for the bacilli enteritidis sporogenes (Klein) in the milk consumed in 66.6 per cent. of the samples. In 11.1 per cent. of the samples these bacilli were added by the retailer or the consumer, while in 22.2 the source was doubtful.

CHIEF SOURCES OF CONTAMINATION.

A. At the cowshed.

Improperly cleaned milk vessels and the dirty udders of the cows are the source of by far the greatest amount of contamination by organisms, and especially by glucose-fermenters and streptococci. The dirty milk vessels contribute much more than the dirty udders in summer, but in winter the opposite is the case.

Milkers with dirty hands and dirty clothes, and especially wet milkers, contribute their share of pollution.

The air and dust in the cowshed add to the contamination; and coolers, as often used, contribute a certain amount.

B. On the retailer's premises or street.

Badly cleaned cans are a source of contamination here also, although not so great as at the cowshed, owing to the retailer paying greater attention to the cleaning process.

Pollution will take place in retailer's premises owing to the milk receptacles being uncovered, especially where the keeping-place is dusty, or the clothes of the retailer dirty. Organisms may be added by carelessness in handling, *e.g.*, by the use of a dipper which has been kept on a dusty counter.

C. At the consumer's house.

Pollution takes place here as a result of keeping the milk in a dusty place and leaving it uncovered. Only a small amount of contamination occurs from the receptacles of the consumer.

Flies are a source of contamination at all stages of transit, but especially at the consumer's house, where they are usually more abundant."

Although on examining, bacteriologically, any sample of milk, it is usually difficult to say to what extent the bacteria present are derived from human or bovine sources; yet, it may be asserted with some degree of confidence that when type (2)—the bacillus coli communis—and type (3)—the bacillus enteritidis sporogenes—are found in milk, they are in all probability derived from external sources of pollution, probably human, and are not present in the milk as it leaves the udder. These two bacilli, then, are the two most important indicators of excremental and filth pollution. Type (3)—streptococci, although not habitually present, are often found in the teats and diseased udders of cows. Hence, their presence in milk does not indicate their source—human or bovine, or both. These three types of bacteria are closely associated with, and sometimes the cause of, infantile summer diarrhœa, and other gastro-intestinal disturbances. The following results by Dr. Orr are interesting; they demonstrate that as cleanliness increases even the permissible bacterial content diminishes from thousands to hundreds.

TABLE II.

	Average Bacterial Content of Milk per c.c. (c.c. = 15 drops).					
	Cans Sterilised by Steam.					Dirty Cans and Udders.
	Udders.					
	Dirty.	Dry Brushed.	Washed.	Washed and dried.	Washed and left moist.	
Milk from Single Cows	11,250	11,200	No test.	900	472	No test.
Mixed Milk from whole herd of cows :—						
EXPERIMENT A	17,600	No test.	4,047	No test.	No test.	
EXPERIMENT B	18,000	,,	3,460	,,	,,	106,600

Bacterial contamination by means of excreta—in an average of 4 experiments Orr found 3,478,220 bacteria per gram in fresh cows' manure; whereas, in old manure adhering to the hair of the cow and sticking to the udder, legs, etc., he found 5,487,717,000 bacteria per gram. The old manure is kept warm, and here the bacteria multiply rapidly; and it is from this old manure that pollution of milk chiefly takes place in milking, while very little can occur from fresh manure.

During the past few years several reports of high merit, and books have been written on the bacteriology of milk, and there can be no hesitation in expressing the opinion that the bacteriologist can always measure, with reasonable accuracy, excremental and other kinds of undesirable pollution in milk.

Therefore, it is to be hoped, and I believe, that health authorities will take advantage of available science; and that by instituting municipal bacteriological laboratories, where milk will be tested by a recognised method and a fixed standard, each dairyman will have to bear a certificate according to the purity of his milk, which certificate shall be given by the health authority.

Section V.

THE CONTROL OF THE MILK SUPPLY, WITH SOME SUGGESTIONS.

Legislation.

The chief legislative measures under which health authorities in England have acted in exercising more or less control over milk supplies are briefly:—

(1) The Contagious Diseases (Animals) Act, 1878, which was the first Act of Parliament through which certain powers were conferred on local authorities for the protection and control of milk supplies; and which has formed the ground work of succeeding Orders.

(2) The Dairies, Cowsheds, and Milkshops Order, 1885, with accompanying model bye-laws; and with Amending Orders in 1886 and 1899.

(3) The Infectious Diseases Prevention Act, 1890.

(4) Certain sections of the Public Health Act, 1875, and its Amending Acts.

In addition, many authorities since 1899 have obtained special powers to deal with certain conditions, especially tubercular milk, under their local Acts.

These various measures have from time to time been severely criticised and often found very defective for attaining the end in view—a pure milk supply. Probably one of the greatest defects has been that in towns, health authorities have no direct control over the milk supplies coming from farms outside their respective areas. Many such farms are in rural districts where we know from experience that inspection and control are most required. But at the same time, it has to be admitted that the most important of these measures—the Dairies Order of 1885, with its accompanying regulations or model bye-laws, has been administered in many districts—especially rural districts—with considerable laxity. In many places regulations or bye-laws under the Order, 1885, have not been adopted; or, if adopted, are not enforced.

By the Amending Order of 1899, tuberculosis was included among the diseases of cows from which milk was not to be sold as human food, and certain powers given to local authorities. These, in practice, have been found very unsatisfactory in so far as no provision was made for the disposal of tubercular cows. In order to remove these and other defects, and ensure a more uniform and consistent administration of milk legislation, the President of the Local Government Board introduced to Parliament during the present Session, his too long-delayed Milk and Dairies Bill, which he anticipated would be added to the Statute Book this Session. It is much to be regretted that the exigencies of Parliamentary business demanded that this Bill should be included amongst the "slaughter of the innocents," but it is to be hoped that it will be one of the first Bills considered in the following Session.

The main provisions of this Bill as set forth in the memorandum, and a summary of the provisions of the Tuberculosis Order of 1909, which comes into operation on the 1st April, 1910, are given in App. D.

Private Enterprise.

While legislation and its interpretation by local authorities has been followed by a measured degree of success, a great deal of good has been achieved in raising the standard of the milk supply by private enterprise; and by such companies as the Copenhagen Dairy Company in Denmark, the Aylesbury Dairy Company in England, and the Philadephia Milk Commission of America. The aim of these companies has been to provide a naturally pure milk supply — a "model" milk supply — rather than artificially purified milk by pasteurisation or sterilisation, and hence the centre of their work is at the farm — the chief source of pollution.

A description of how business is conducted by these companies cannot be given here. But, briefly, each farmer supplying milk has to agree to certain conditions of contract, for the contravention of which there is a heavy penalty —£100 in some cases. The cows have to be warranted free of disease and examined for tuberculosis by the tuberculin test. Conditions of cowshed, lighting, ventilation, cleansing, drainage, water supplies, cleanliness of milkers, cooling and straining milk, chemical and bacteriological tests, protection of milk from infection, and other standards are distinctly laid down, and to ensure that these conditions are observed the inspectors of the companies regularly visit the farms.

Education.

Under the New Milk and Dairies Bill power will be given to local authorities to establish milk depôts for the sale of milk specially prepared for infants, and for the supply of this milk we may suppose a "model" dairy farm. The institution in Rochdale of such a "model" dairy farm would, in my opinion, achieve the greatest good. Not only would it supply babies with pure milk, but it would educate public opinion; and, most important, it would be an inspiration and stimulus to many farmers and dairymen, who may care to learn the science of their business; while as a corollary it would follow that those who will not learn must gradually succumb for lack of customers.

This educative work might be followed up by the distribution of pamphlets containing suggestions regarding useful literature on farming and dairying, and the value of its study; how dairy farming in Denmark, only a few years ago a decadent industry, is now by the application of science the most prosperous in that country; and how the Dane by embracing the gospel of cleanliness can carry his produce across the sea and out-sell the English farmer at his own door.

By careful selection in breeding and management of his cows, the Danish farmer has quite commonly an average yield of 800 to 900 gallons per annum per cow, and the milk fat never below 3 per cent., but nearer 4 per cent., and above it.

Such valuable experimental results as have been obtained by the Highland and Agricultural Society of Scotland, the Aylesbury Dairy Company, and a few others, ought to be known to every dairy farmer. One set of cows were kept under conditions of "free ventilation" and at ordinary temperature, the other set under "restricted ventilation" and higher temperature. In the Scottish experiments the temperature of the first set of cows averaged 49.82° F., in the second set 59.40, a difference of 9.58°. These experiments have been repeated, and in every case the results, both as regards quantity and quality of milk and higher percentage of milk fat, and freedom of sickness amongst the cows, are distinctly in favour of the cows kept at ordinary temperature and free ventilation. Such results should convince every dairy farmer who is capable of reasoning or even of forming a contrast, of this fallacious and superstitious notion, so deeply ingrained in the minds of many as almost to become a fetish, that the cow kept in a dark ill-ventilated, ill-lighted, hot and vitiated atmosphere, must be a good milker.

A dairy farmer should know something of the natural history of bovines. Cows in early autumn begin to develop a coat which becomes longer and closer as the weather gets colder; and if the cowsheds are kept too hot, such animals begin to perspire freely and shed their hair, because, in the economy of nature, what is not useful is cast off. The present method of housing cows is an inversion of nature's method. In heated, ill-ventilated cowsheds, cows have their thinnest coat in winter, and consequently are more liable to colds, inflammation of the udder and other diseases.

If by this and such other educative means, farmers could be induced to take more intelligent and scientific interest in their business, and recognise their great responsibility, then one would expect some real fundamental progress. Then they would more readily avail themselves of all reasonable recommendations, and appreciate suggestions on all such subjects as ventilation and lighting, drainage and water supplies, cleanliness in cowshed, of cows, of milker, utensils, the pollution of milk by infection, dust, etc., and to discuss all new ideas and standards regarding their business.

The dairy farmer in the end would recognise, that the adoption of new improved and scientific methods all make for more profit and contribute to his credit as an individual. Recently, I had some interesting interviews with some farmers in the environs of Manchester, who a few years ago were slum-farmers, but are now proud to be the leading and most up-to-date in the district.

One would also like to see more utilitarian co-operation, sympathy, and trust between landlord and dairy farmer. The former is often a man who has travelled more and seen more, and, whom we might expect to take some intelligent interest in his farms and to encourage his tenants to introduce more modern and more scientific methods.

Many dairymen readily recognise that, with bad general arrangements and serious structural defects, it is impossible to carry on their business satisfactorily and produce a reasonably pure milk. At the same time they argue that, while the owner will do nothing but exact the highest rent from the highest bidder; and while they have no security of tenancy, they are unable in such circumstances to carry out improvements, however much this may be desirable; and in genuine cases this argument is reasonable. The milk supply, however, of any community is too serious a matter to be jeopardised by the exigencies of landlord and tenant; and under the new Milk and Dairies Bill, not only the dairyman, but the premises have to be registered, and the local authority may remove from the register, or refuse to register, any premises which are unsuitable or which do not comply with the provisions of this Act. In this respect all the cowsheds in the category of "bad" will be seriously affected. In the Scottish Bill, dairies are to be held on an annual licence, and any delinquency occurring during the year will be considered before granting a new licence.

At the same time, one must admit that there is a growing tendency, by many in every sphere of life, to placidly sit down waiting and hoping that some one else, or the State, will always do something, instead of determining one's own career by those ancient and traditional British qualities of self-help, self-reliance, and independence; and farmers need only be reminded that, although the State is at present contemplating some beneficial legislation for agriculture, it will avail them little without those qualities of mind and action.

Having made clear to each dairy farmer what is expected of him and how his business should be conducted, it will be necessary to prepare, and to supply each dairyman with, a set of bye-laws or regulations, and for the contravention of which a penalty will be inflicted. Heretofore, local authorities in virtue of powers conferred by the Contagious Diseases (Animals) Acts and relative Orders, have made bye-laws and regulations:—

(1) For the inspection of cattle in dairies.

(2) For the prescribing and regulating the lighting, ventilation, cleansing, drainage, and water supply of dairies and cowsheds in the occupation of persons following the trade of cowkeepers or dairymen.

(3) For securing the cleanliness of milk stores, milk shops, and of milk vessels used for containing milk for sale by persons following the trade of cowkeepers or dairymen.

(4) For prescribing precautions to be taken by purveyors of milk, and persons selling milk by retail, against infection or contamination.

However, if, as is anticipated, the Milk and Dairies Bill becomes law during the following Session, much of the legislative machinery and procedure will become greatly modified. This Bill promises to place the whole question of the public milk supply on a satisfactory basis, and its main objects are set forth in the memorandum to the Bill (see App. D). Under this Bill registration and uniformity of administration will be more complete. Powers are also given for the prohibition of the sale of tuberculous milk; for the establishment and management of milk depôts for the supply of milk specially prepared for infants, etc.; while the Local Government Board reserve powers for the enforcement of the duties of local authorities.

The accompanying Tuberculosis Order issued by the Board of Agriculture and Fisheries, which comes into operation on the 1st April, 1910, has for its aim the extirpation of bovine tuberculosis from the milking herds of England.

In this Order we have the first evidence of a co-ordinated and comprehensive effort to deal with this difficult and pressing question; and in carrying it out a serious responsibility will rest on every local authority and its officials. In one respect, however, this Order appears defective, inasmuch as the whole compensation to be paid for condemned tubercular cows has to be paid by the local authority. Since the extirpation of bovine tuberculosis is a national question; and if one half or two-thirds of this money was refunded from the National Exchequer, it would ensure a more universal and equable administration of this Order throughout England. As the Order stands, the more active any local authority becomes, the greater will be the initial expenditure in compensation, at least for one or two years; while local authorities who remain inactive, the less will be their expenditure and their districts will remain, as at present, the dumping ground for tubercular cows, and in so far as this takes place will the great object of this Order be retarded.

Then there should be a descending scale of compensation, correlated with certain time limits, as farmers must recognise their responsibilities and study their business so as to avoid keeping up the supply of the tubercular cows. Many of the considerations which were before the Local Government Board when these measures were framed are discussed in previous pages.

As illustrating what can be done without the stimulus and driving power of State legislation, it may be added very briefly that in some European countries, especially Denmark, a great deal has already been accomplished by individual enterprise to extirpate tuberculosis from their milking herds; and there are now in that country 600-700 large milking herds, which have been freed from tuberculosis. The method adopted in Denmark was devised by Professor Bang, of Copenhagen; it is simple, very inexpensive, but requires time and watchfulness on the part of the dairy farmer. Briefly, the method depends upon:—

(1) The use of tuberculin to diagnose the disease.

(2) The complete separation of healthy animals from diseased.

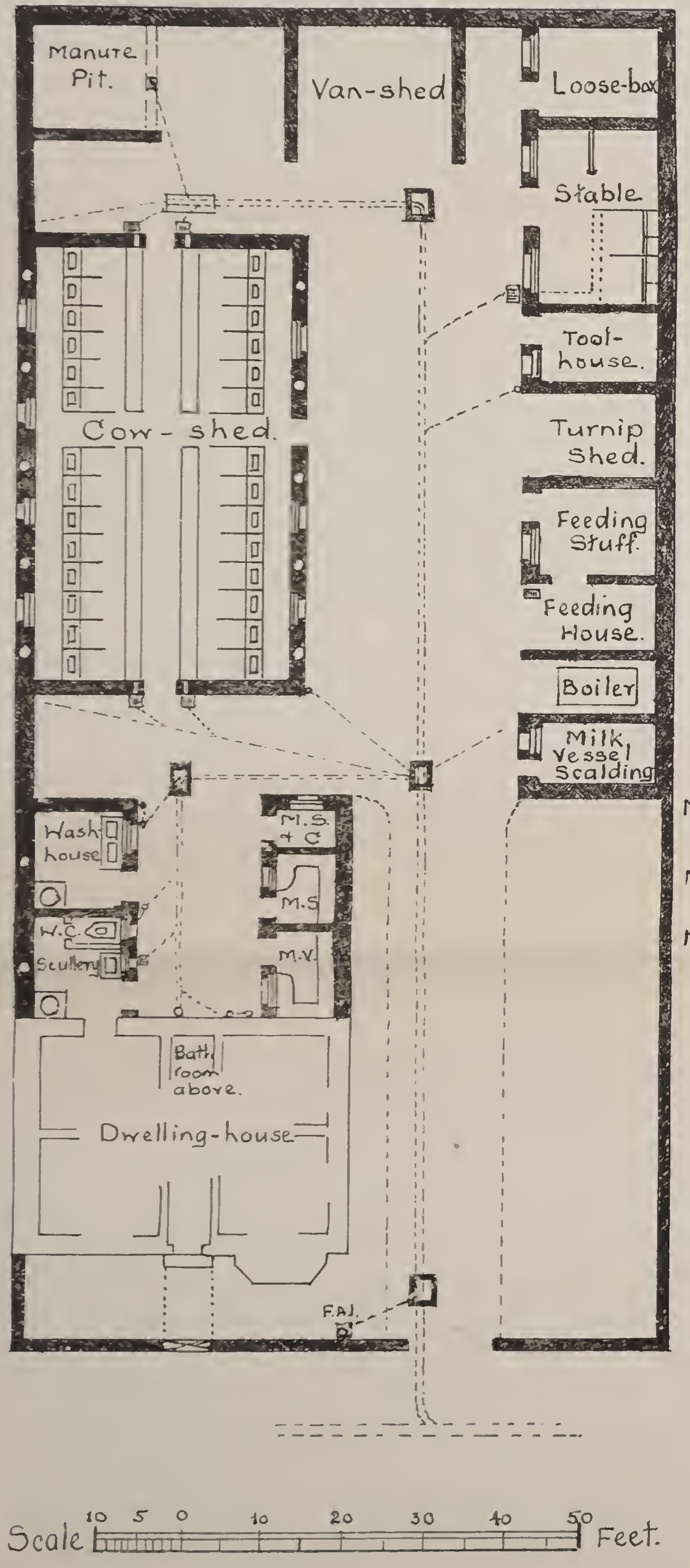
(3) The gradual rearing up of a healthy non-infected stock. Calves born of tubercular mothers are at once removed to a place free of infection and reared on tubercle-free milk; and, in this way a tubercle-free herd is reared up, even from an infected herd, and ultimately takes the place of the latter.

In North Germany the method in operation was devised by Professor Ostertag, of Berlin. It is very inexpensive, and consists essentially in removing at once all cases of open tuberculosis or advanced cases from dairy herds, since every new case originates from infection thrown off by an open or infectious case of the disease. In this way infection of the healthy is prevented, and the spread of the disease limited.

Then it is of the highest importance that every one concerned should also clearly understand, that these Acts of Parliament, Relative Orders and Bye-Laws have to be respected. Regular inspection should be made and any infringement dealt with.

For it is a psychological element in human nature that, as the law is justly and righteously enforced, just in the same ratio will it become respected. While on the other hand, laws that are ostensibly made to be respected but broken with impunity, not only encourage evasion, but bring the law itself and its administrators into disrespect.

Plan of Model Dairy Premises and Cowshed.

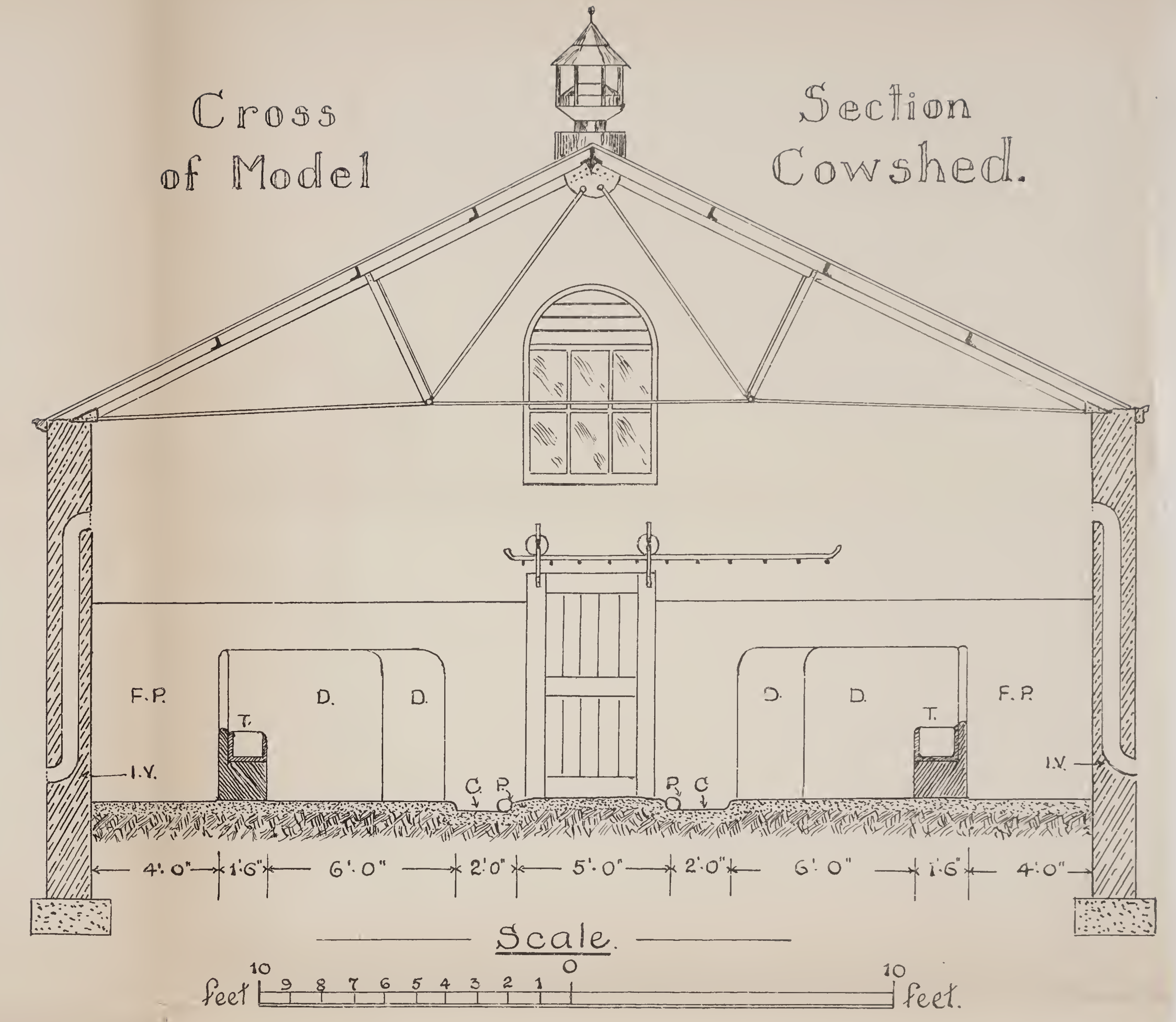


M.S.+C = Milk Straining and Chilling.

M.S. = Milk Store.

M.V. = Milk Vessels.

Cross Section of Model Cowshed.



Definitions

I.V. = Inlet Ventilator.

F.P. = Feeding Passage.

T. = Trough.

D.D. = Divisions between Stalls.

C. = Channel.

P. = Pipe Drain through external Wall.

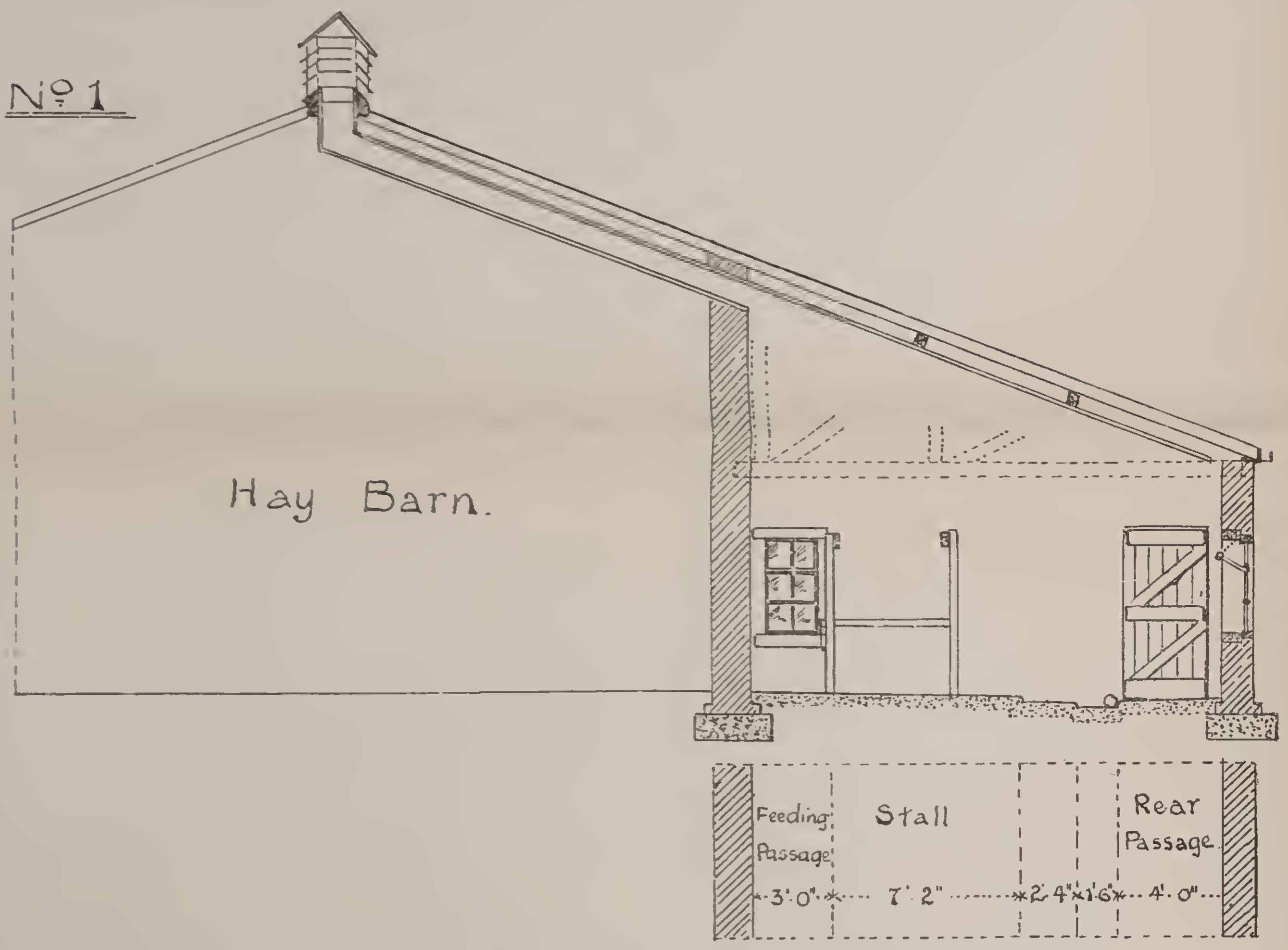
Note:-

Sliding Door (shewn inside) is on outside of building.

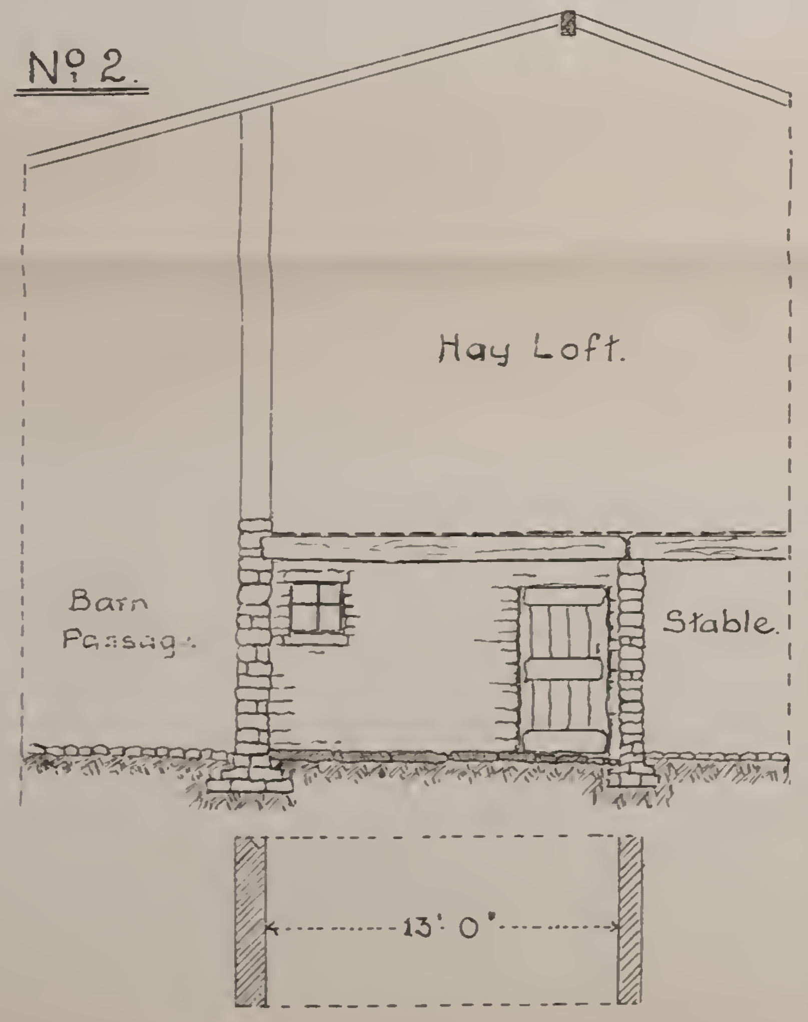
Sections of Typical Cowsheds.

SCALE 1/8" = 1'0"

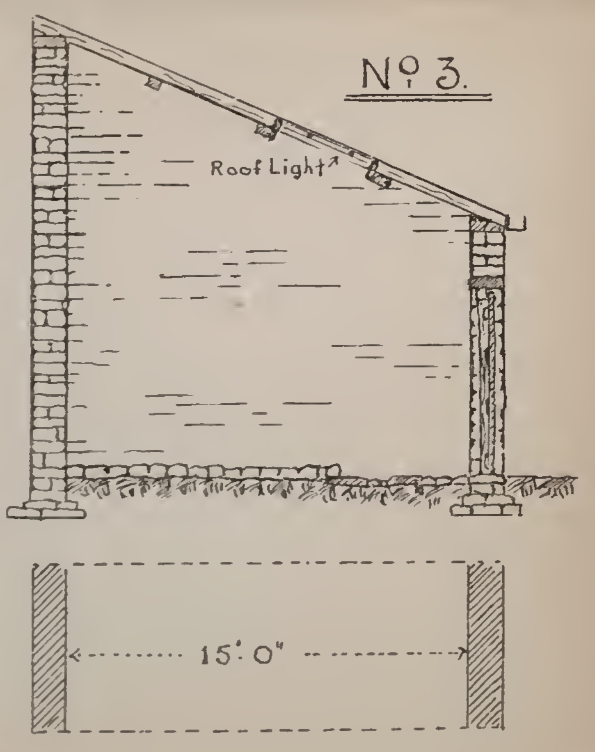
Nº 1



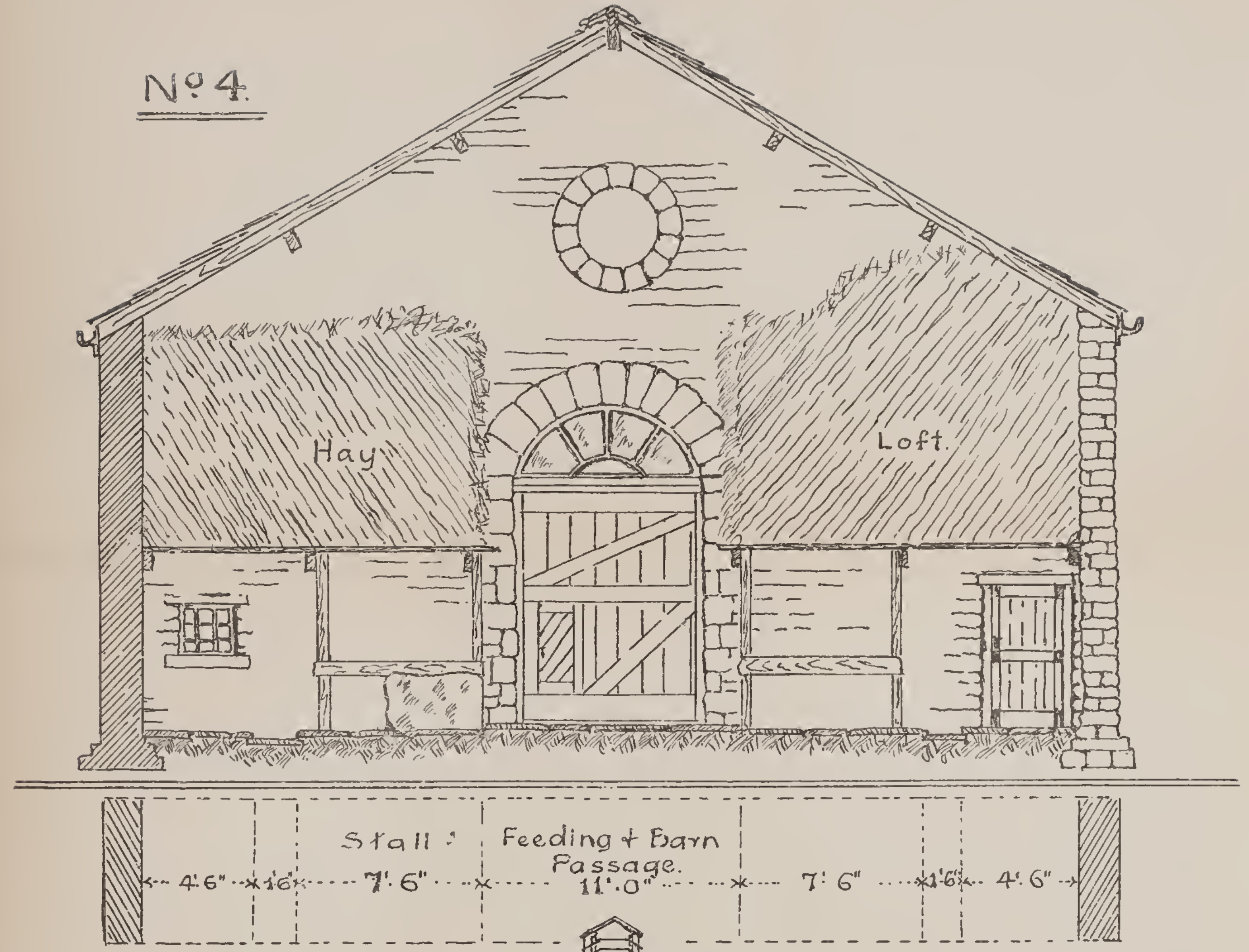
Nº 2.



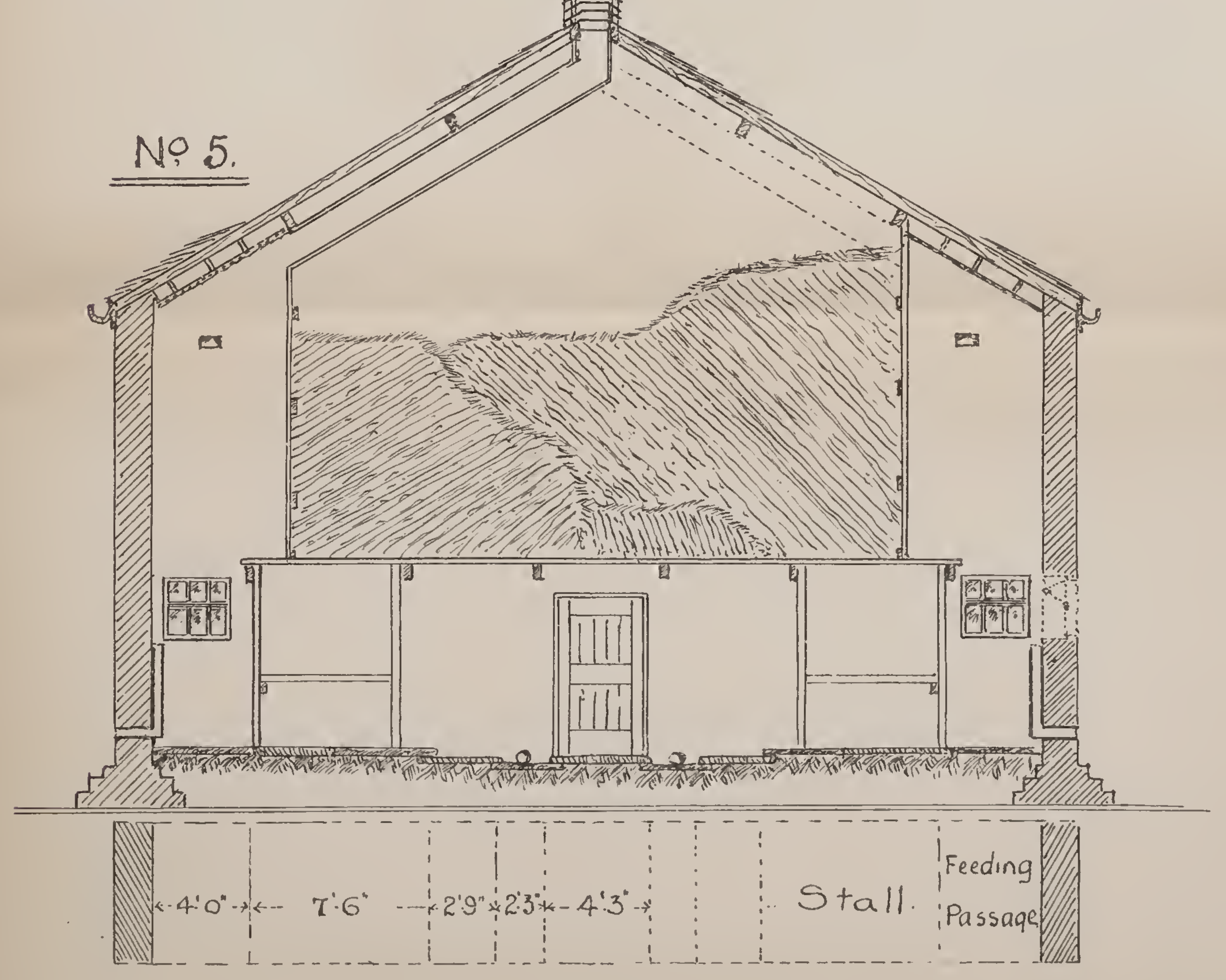
Nº 3.



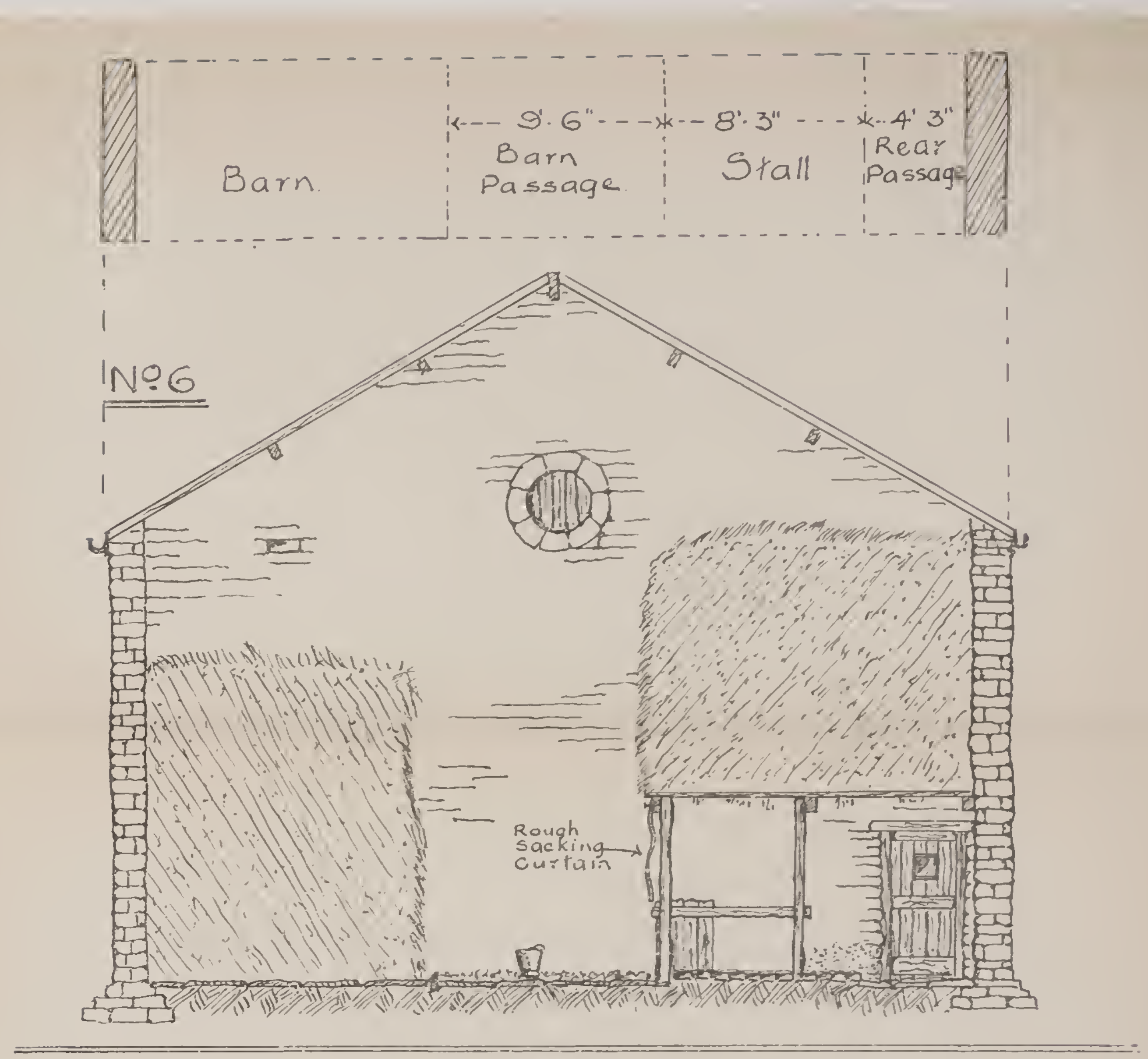
Nº 4.



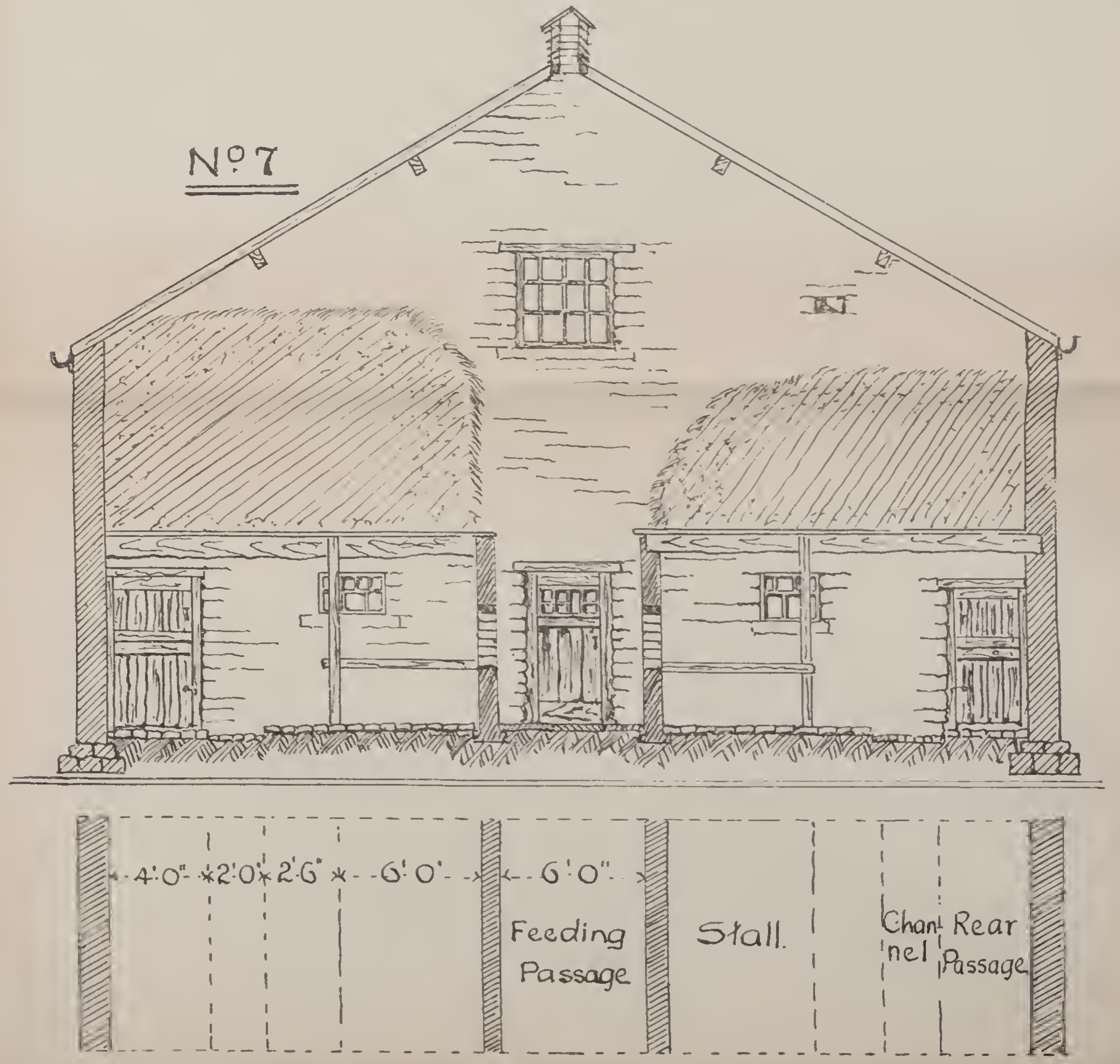
Nº 5.



Nº 6



Nº 7



Appendix D.

MILK AND DAIRIES BILL.

MEMORANDUM.

The main objects of this Bill are to provide for—

(1) The more effective registration of dairies and dairymen;

[Not only the dairyman but the dairy must be registered; and the Sanitary Authority may refuse to register or remove from the register any dairy premises; (a) if they become or are unsuitable to the purposes of the business carried on or proposed to be carried on; (b) or if the premises are a nuisance or do not comply with the provisions of this Act or the Orders made thereunder.]

(2) The inspection of dairies and the examination of cows therein;

(3) The prohibition of the supply of milk from a dairy where such a supply has caused or would be likely to cause infectious diseases, including tuberculosis;

(4) The prevention of the sale of tuberculous milk;

(5) The regulation of the importation of milk so as to prevent danger to public health arising therefrom;

(6) The issue of regulations for securing the supply of pure and wholesome milk;

(7) The establishment by local authorities, in populous places, of milk depôts for the sale of milk specially prepared for infants.

TUBERCULOSIS ORDER OF 1909.

This Order was issued by the Board of Agriculture and Fisheries of date May, 1909, and comes into operation on the 1st April, 1910.

Its main provisions are as follows:—

Section I deals with interpretation of terms and is here omitted.

In the following sections L.A. = local sanitary authority; Board = Board of Agriculture and Fisheries.

Section II.—Notification of disease.

The responsibility is placed on every dairyman and any other person, who may have in his possession any cow which is or appears to be suffering from any form of tuberculosis of the udder, or any other bovine animal which appears tubercular, to take means to at once notify the L.A., and to take certain precautions with respect to tubercular milk.

Section III.—Inspection and examination of animals.

The L.A., on receiving such information, or otherwise, if they have reasonable ground for supposing that any cow or other bovine within their district is suffering from tuberculosis, shall cause an examination to be made by a veterinary inspector, who shall as soon as possible report to the L.A. (methods of examination by tuberculin and bacteriological tests are here omitted).

Section IV.—Slaughter of diseased animals.

When the L.A. are satisfied on the report of their inspector, that any cow within their district is suffering from tuberculosis of the udder, or giving tuberculous milk, or a bovine animal suffering from tuberculosis, they shall give notice in writing to the owner and also to the Board, and cause the animal to be slaughtered. If the owner objects in writing, or if the value of the animal is above thirty pounds, then it can only be slaughtered by the special authority of the Board.

Section V.—Valuation for compensation.

Before the slaughter of an animal the L.A. shall either agree with the owner regarding the value of the animal in its condition at the time of valuation; or, if they fail to agree, then a valuer has to be appointed by the L.A., or by the Board through the L.A., and he shall give to the L.A. and to the owner a certificate in writing of the ascertained value.

Section VI.—Post-mortem examination of slaughtered animals.

In the case of every animal slaughtered, a post-mortem examination must be made at once by the veterinary inspector of the L.A., and the result of such examination has to be reported to the owner and L.A. in writing.

Section VII.—Compensation.

If the L.A. fail to carry out Section VI, or if the certificate of the veterinary inspector shows that the animal was not suffering from tuberculosis, then the L.A. shall pay to the owner the sum agreed on at the time of valuation, and a further sum of twenty shillings.

If the certificate shows that the animal was suffering from advanced tuberculosis, such as:—

(*a*) When there is miliary tuberculosis of both lungs;

(*b*) When tubercular lesions are present on the pleura and peritoneum;

(*c*) When tubercular lesions are present in the muscular system, or in the lymphatic glands embedded in or between the muscles;

(*d*) When the carcase is emaciated and tuberculous lesions are present.

Then the L.A. shall only pay a sum equal to a quarter of the value of the animal previously agreed on or ascertained by the valuer; or the sum of two pounds, whichever sum is the greater after deducting from this compensation half of their reasonable costs of valuation and examination.

If on the other hand the certificate of the veterinary inspector shows that the animal was suffering from tuberculosis, but not advanced tuberculosis, then the L.A. shall pay to the owner three-quarters of the value agreed on after deducting half of expenses.

Several other sections follow dealing with precautions to be adopted with respect to milk, etc.; detention and isolation of suspected animals; suspected animals in markets and fairs and sales; cleansing and disinfection; reports to Board; offences, etc.; but are not here summarised.

Specimen of 16 Summary Sheets which formed Appendix "A."

Giving a description of three types of Farms.

INDEX NO. OF FARM.	Total No. of Cow-sheds to Farm	Designation of Cow-shed.	General Structural Condition	No. of Cows Housed	If Overcrowded and No. of Cubic Feet per Cow.	Lighting Area, if sufficient and No. of Square Feet per Cow or Stall.	VENTILATION.		FLOORS.		Drains; Trapped or Untrapped; Inside or Outside Cowshed.	WALLS AND PARTITIONS		Clean or Dirty Condition of Cows.	Description of Bedding.	Arrangement of Stalls.	Ceiling Construction and whether Hay stored above.	Whether Hay Liable to Pollution.	Appliances actually within Cowshed for Personal Cleanliness.	(A) Water Supply (B) Drainage Outlet.	Yard Paving and Drainage.	Dung Pit.	Alleged Method of Cleansing Udders and Teats.	Alleged Methods of (A) Filtering (B) Chilling Milk.	Description of Place where Vessels are washed.	Alleged Method of Cleansing Vessels.	Whether Hot Water Supply Separate from Domestic.	Description of Place where Milk is stored when so required.	Means for the Prevention of Entrance of Dust to Milk Stored.	REMARKS.
							Means of Ventilation and if Good or Bad.	Reasonable use made.	Description and if Sloped and Channelled.	How Cleansed and how often.		Condition.	No. of Times per Year Lime-washed.																	
40	1	...	Very good.	24	No: 1016 cubic feet per cow.	Sufficient and good. 6 square feet per cow.	Extraction shafts to ridge of roof; all windows openable; good.	Yes.	Well flagged, sloped, and channelled.	Brushed out twice a day.	Trapped; outside; good.	Clean.	Twice.	Clean.	Shoddy.	One row; cows face feeding passage, ventilated over; good space at rear.	Sloping roof; under-drawn; no hay over.	No.	Water tap only.	(A) Well water; abundant. (B) Drains discharge to cesspool 70 yards from cowshed.	Properly paved and drained, and kept clean.	No proper pit; dung deposited in field 30 yards from cowshed	Rubbing with dry cloth at each milking.	(A) Passing through metal sieve. (B) Not chilled; no apparatus.	Carried on in scullery; fairly well lighted and ventilated, walls and ceiling limewashed plaster; floor flagged; fair repair; clean.	Washing with cold water; scalding with hot water drying with cloth.	No, water boiled in large kettle on kitchen fire.	Ground floor, light and ventilation fair; walls of lime-washed brick; floor flagged; fair repair and clean; used also as a pantry.	Wide open-topped glazed earthenware vessels covered with cloth.	The cowshed is light, airy, and well ventilated and is kept thoroughly clean. The cows are well groomed and their udders and teats are kept clean.
7	1	...	Fair.	11	Yes: 500 cubic feet per cow.	Sufficient; 3¼ square feet per cow and well distributed.	All openable windows; good; but hole in ceiling to hay loft as outlet is bad.	Yes.	Fairly well flagged; sloped and channelled.	Brushed out three times a day.	Trapped; outside; and in fair condition.	Lower parts badlysplashed with dung.	Twice.	Dirty.	Shoddy.	Two rows; cows face each other with 6ft. wide passage between; an extra stall has been made.	Close-jointed boards; hay stored over	Yes; owing to method of ventilation.	Nil.	(A) H. & M. Water Board supply; sufficient. (B) Drains discharge to cesspool near by; pump to same broken.	Well paved with grit setts; fairly well drained and free from refuse.	No defined boundary; heap of dung 12 feet from cowshed in corner of yard; badly drained.	Rubbing with dry cloth.	(A) Passing through two metal sieves. (B) No attempt to chill; no apparatus.	Carried on in scullery adjoining living room; used also as wash-house; flagged floor; plastered walls and ceiling; clean, in fair repair and good order.	Rinsing with cold water; washing with hot water and drying with cloth.	No; rustless domestic boiler in kitchen fire-range is used	Underground; badly lighted, badly ventilated, floor of concrete, walls and ceiling lime-washed; area containing window in dirty condition.	Nil. Milk exposed to dust through broken window in area.	Midden privy is too near dwelling house, and too near drinking trough. Very little milk is stored. Two cows were found to be housed in a stable adjoining provender store.
18	2	A	Very bad.	2	902 cubic feet per cow, but no ventilation.	Not sufficient; 1½ square feet per cow; only one small window	Practically nil; one opening in wall ¼ square feet area.	...	Very badly paved with bits of flags and setts; no channel; no slope; floor in very dirty condition.	Cannot be cleansed properly.	Untrapped and inside; inlets very dirty; defective brick drains; bad.	Dusty; lower parts caked with dung.	Twice.	Not clean.	Shoddy.	One row; cows face and breathe on to wall; not sufficient space at rear.	Partly open boarded ceiling 9ft. 4in. high; hay stored over.	Yes.	Water tap only.	(A) Town's supply; abundant. (B) Old and defective brick drains discharging into ditch at bottom of adjoining meadow.	Yard surface of broken and uneven flags; not properly drained; yard area too small.	Fairly well constructed with good flag floor, but not drained; 50 feet from cowsheds.	Not cleansed.	(A) Passing through metal sieve. (B) No chilling apparatus; in hot weather cans of milk are stood in large tub of water in yard.	Carried on in small wash-house adjoining living room and forming the entrance or porch to dwelling; good light; walls lime washed brickwork; floor flagged; in fair repair and fairly clean; roof not under-drawn; not adapted.	Rinsing with cold water; scalding with boiling water and soda; wiping with clean dry cloth.	No; small domestic boiler in kitchen fire-range is used.	No milk stored; no convenience for storing.	No milk stored.	Both cowsheds are unfit for occupation, and the whole place is not adapted for cow-keeping. Foul midden privy in yard and almost communicating with cowsheds. Pig stye adjoins the midden privy. Both are contained in yard of dwelling, which is also yard of cowsheds.
		B	Very bad.	2	Yes; 649 cubic feet per cow, and no ventilation whatever.	Not sufficient; 2¼ square feet per cow.	No means of ventilation.	...	Very broken and uneven flagging; badly jointed; liquid percolates; no proper slope; no channel.	do.	do.	do.	Twice.	Not clean.	Shoddy	One row; cows face and breathe on to the wall which is partly underground; not sufficient space at rear.	do.	Yes.	Nil.											